DOCUMENT RESUME

ED 150 854 FL 009 253

AUTHOR	Herbert, Robert K., Ed.
TITLE	Proceedings of the Sixth Conference on African Linguistics. Working Papers in Linguistics, No. 20.
INSTITUTION	Ohio State Univ., Columbus. Dept. of Linguistics.
PUB DATE	Sep 75
NOTE	305p.; Proceedings of the Conference on African Linguistics (6th, Ohio State University, Columbus, Ohio, April 12-13, 1975)
EDRS PRICE	MF-$0.83 HC-$16.73 Plus Postage.
DESCRIPTORS	*African Languages; Bantu Languages; *Contrastive Linguistics; Creoles; *Diachronic Linguistics; Distinctive Features; Hausa; Language Patterns; *Language Research; Linguistic Theory; Luo; Morphology (Languages); *Phonology; Sentence Structure; Swahili; *Syntax; Tone Languages; Uncommonly Taught Languages; Vowels; Yoruba
IDENTIFIERS	Duala; Gude; Ibibio; Lango; Moore; Volta Comoe

ABSTRACT

This volume contains a selection of 27 papers presented at the Sixth Conference on African Linguistics. The papers cover a very wide range of topics, and are organized into three sections: (1) Historical and Comparative Studies; (2) Phonology; and (3) Syntax. The conference program, the program of the symposium on African language, culture and society, and a list of the addresses of the contributors conclude the volume. (CLK)

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PROCEEDINGS OF THE SIXTH CONFERENCE ON AFRICAN LINGUISTICS

ROBERT K. HERBERT

EDITOR

Proceedings of the Sixth Conference on
African Linguistics, Held at
The Ohio State University, Columbus

April 12-13, 1975

FL009253

Ohio State University
Dept of Linguistics

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DEPARTMENT OF LINGUISTICS

THE OHIO STATE UNIVERSITY

COLUMBUS, OHIO 43210

WORKING PAPERS IN LINGUISTICS NO. 20

2 SEPTEMBER 1975

Introduction

The present volume contains a selection of papers presented at the Sixth Conference on African Linguistics, sponsored by the Department of Linguistics, The Ohio State University, Columbus, on April 12 and 13, 1975. Several of the papers included here have been revised and expanded following their presentation at the Conference.

An integral part of this year's Conference was the day-long Symposium on African Language, Culture and Society, held on April 11, 1975. As its name indicates, the Symposium was much more interdisciplinary in scope than the Conference itself, combining both linguistic and social science skills at a rather sophisticated level. The proceedings of the Symposium, *Patterns in Language, Culture, and Society: Sub-Saharan Africa*, will comprise a separate volume in the Ohio State *Working Papers in Linguistics* series. The programs for the Symposium and the Conference appear in the appendix to this volume.

Some forty-two papers on a wide range of topics were read at the Conference. If we add to this number the sixteen papers delivered at the Symposium, we arrive at the impressive total of fifty-eight presentations in a three-day period. The authors represented many American universities as well as twelve foreign institutions. Over 150 people registered for the Conference arriving from such diverse points as Dar-es-Salaam, Ibadan, Rio de Janeiro, Paris, Hamburg, and Los Angeles. Many people commented on the high quality of papers presented at the Conference which, we believe, reflects the increased sophistication of specialists in the field. The papers included here should be of interest not only to Africanists, but to the general linguist as well since they are not merely fragmentary and descriptive in nature, but rather integrated and organized around certain central questions in linguistic theory.

Only slightly more than half of the Conference papers are presented in this volume. This should not be taken to imply that the others were of lesser quality. Several authors, in light of discussion at the Conference, decided to revise their papers substantially and were therefore unable to submit manuscripts in time for publication. Additionally, some participants decided to publish their papers elsewhere. The papers by Chet A. Creider and J. Peter Denny on the semantics of noun classes in Proto-Bantu and by Charles DeBose on creole speech communities are included in the proceedings of the Symposium. Several papers scheduled for the Conference could not be presented because the authors were unable to attend. As we believe the primary purpose of a conference such as this to be the open exchange of ideas, we have taken the liberty to include here abstracts of two papers scheduled for presentation by Soviet linguists who could not attend the Conference.

For the success of the Conference, we are indebted to a large number of people. We are grateful to all the authors who contributed to this volume and to all those who registered for and participated in the Conference. Larry Hyman (University of California, Berkeley and University of Southern California), Will Leben (Stanford), Herb Stahlke (Georgia State), and Arnold Zwicky (Ohio State) gave thoughtful suggestions and served with me on the Abstracts Committee for the Conference. I wish to express my thanks to all those who served as session chairmen for the Symposium and the Conference: Johanna DeStefano (Ohio State), Victoria Fromkin (University of California, Los Angeles), Morris Goodman (Northwestern), Robert J. Jeffers (Ohio State), William Leben (Stanford), Gayle Partmann (Oakland), William J. Samarin (Toronto), Erhard Voeltz (Indiana), and Arnold M. Zwicky (Ohio State). I would like to express my special thanks to Dr. Michael L. Geis, Chairman of the Department of Linguistics for his constant encouragement and cooperation. Finally, for her painstaking help in the organization of the Conference and the preparation of this volume, we are again indebted to Marlene Deetz Payha.

Robert K. Herbert
Conference Coordinator

Columbus, Ohio
August 1975

Proceedings of the Sixth Conference on African Linguistics

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.1-15 (1975)

Toward a Reconstruction of Proto-Nilotic Vocalism*

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1. Introduction

There are two theories about the interrelationship of the Nilotic languages. The first, or traditional, theory has held that there are two major subdivisions: Nilotic Proper (Dinka and Nuer plus the Lwo languages) and Nilo-Hamitic or Paranilotic (see Tucker and Bryan 1966:443; see Köhler 1955 for a history of this terminology). The second theory, that of Köhler (1955), which was taken up by Greenberg (1963), holds that there is a single unitary Nilotic family consisting of three coordinate branches: Western (the traditional Nilotic Proper); Eastern (Bari, Maasai, etc.); and Southern (the Kalenjin languages plus Tatoga).

The fact that the Western and Southern sub-divisions form units within themselves can easily be arrived at by inspection. The comparison of dictionary pages for any two languages within either of these sub-groups will yield a very high percentage of probable cognates between let us say Dinka and Luo or between Nandi and Päkot. Within Western and Southern Nilotic the unity seems, in each case, to be at least as tight as that within Romance.

In the case of Eastern Nilotic the unity is somewhat less immediately transparent. There are, however, many convincing correspondences which will yield themselves to a few minutes' inspection.

When it comes to Nilotic as a whole the unity is also clear but the pieces seem to fit together much less well. On the one hand there exist clear down-the-line cognate-sets like the word for 'crocodile':[1]

(1)	Shilluk	nyaŋ	TB
	Acholi	nyaŋ	Cr
	Lango	aki-nyaŋ	W
	Alur	nyaŋ	R
	Luo	nyaŋ	Staf
	Dinka	nyaŋ	W
	Nuer	nyaŋ	Cr
	Bari	ki-nyoŋ	TB
	Maasai	ol-ki-nyaŋ	TB
	Lotuho	ne-i-nyaŋ	TB
	Teso	a-ki-nyaŋ-a	TB
	Nandi	tɪ-nɔŋ-ɛ:t	TB

Proto-Nilotic *nyaŋ

while on the other hand words such as 'bone'

(2)	Shil	cɔ:g-ɔ	W
	Ach	co g-o	Cr
	Lan	co g-o	Dr
	Alur	co g-o	R
	Luo	co g-o	Staf
	Din	yu o-m	Neb
	Nuer	cɔax	W
	Bari	k ʊ y-ʊ	Sp
	Maa	ol- o i- to	TB
	Lot	a-xo - tyo	EBLAV
	Teso	a-ko ɉ-o	HL
	Kar	a-koi - t	G
	Turk	a-koi - t	G
	Nan	ko w-o	Ho
	Päkot	ko w-o	Be

Proto-Nilotic $*k^y$ɔgɔ

while they are also clearly cognate, require the postulation of some rather complex sound changes and morphological reconstruction, so that Nilotic proto-forms cannot be reconstructed for them at a glance.

The work we are reporting on here is a preliminary step in a long-range project for the reconstruction of Proto-Nilotic by the application of the traditional comparative-historical method. Previous work on Nilotic has largely been descriptive and typological (e.g. Tucker and Bryan 1966) rather than historical or reconstructive. The major exception would seem to be Köhler's unpublished dissertation (1948), *Die nilotischen Sprachen. Darstellung ihres Lautsystems, nebst einer Einleitung über die Geschichte ihrer Erforschung, ihre Verbreitung und Gliederung,* of which only the history of their study has been published (equals Köhler 1955). Appended to this latter work is a table (p. 85), Die Gliederung der nilotischen Sprachen, which gives a tripartite division into West Nilotic, East Nilotic, and South Nilotic. However, no place within the work itself is this division defended by means of reconstructions and proposed shared innovations which would serve to support this proposal.

Greenberg in his *The Languages of Africa* (1963:128 fn. 1) adopted Köhler's subdivisions which he later (1971) reworked slightly. Greenberg supports this subdivision with his standard technique of mass comparison. In no way does he propose proto-forms, state the nature of the innovations which have set the major groups and their subgroups off from one another, or attempt to account for sound changes systematically. It is just this which we hope to do.

As a working hypothesis we have accepted Köhler's and Greenberg's proposal that all of the Nilotic languages are related in a simple fashion and that there are three coordinate branches.

2. Vocalism: Major processes

We have entitled this study specifically "Toward a Reconstruction of Proto-Nilotic Vocalism" because we believe that only through an understanding of the vocalism can an understanding of the consonantism and of word-structure as a whole be achieved.

In addition to the usual types of historical changes whereby such things occur as o's and e's raising to become u's and i's, and vice versa, there are, we believe, four major phonological processes which must be taken into account in order to relate the vocalisms of the daughter languages to one another via verisimilitudinous proto-forms. These are:

(3) Major Nilotic Phonological Processes

1. Vowel harmony of the cross-height type based on tongue root position.
2. Breaking, in which vowels become diphthongized under certain conditions.
3. Umlaut or the fronting of back vowels or diphthongs due to the influence of a front vowel in an adjacent syllable.
4. Syncope and final vowel loss which results in seeming consonantal interchange.

3. Vowel harmony

3.1. Vowel harmony as a synchronic process. Nilotic vowel harmony is based ultimately on tongue-root position. That is, there are two series of vowels which may differ from each other in either point or manner of articulation or both. Whatever the surface realization, the ultimate phonetic gesture which seems to underlie the differentiation is a retraction or advancement of the tongue root (and hence tongue body) rather than the more familiar gesture of simply raising or lowering the tongue body at the point of articulation. As the tongue root is advanced or retracted there result the characteristic changes in voice quality which have been designated by such terms as 'breathy', 'bright', or 'hollow' for the advanced tongue root vowels and 'hard' or 'creaky' for those pronounced with retracted tongue root.[2] These vowel series, with the symbols which we have chosen to represent them in their most abstract form are:

(4) +ATR -ATR

+ATR		-ATR	
i	u	ɪ	ʊ
e	o	ɛ	ɔ
ɑ		a	

What is especially noteworthy about the vowel harmony systems of the Nilotic languages is that the vowels of the [+ATR] series are always dominant in that they cause [-ATR] vowels in the same word to become [+ATR]. [+ATR] vowels never change into [-ATR] ones; the [+ATR] vowel which causes the change may be contained in either a root or an affix. A certain small number of morphemes are not only inherently [-ATR] but also are not affected by the presence of a [+ATR] vowel; these morphemes may be termed opaque to the vowel harmony process. Not only do these opaque morphemes not change [ATR] category themselves, they also block harmony from applying across them. We have discussed Kalenjin and general Nilotic vowel harmony in some detail in Hall, et al. (1974).

3.2. Vowel harmony as a diacrhonic process. Since this type of vowel harmony is found in each of the present day Nilotic languages, with no more than the expected variation as to how thoroughgoing its realization is and no more than a slight amount of language-particular variation in the surface phonetic manifestation of some of these vowels, especially the [+low, +ATR] vowel, then it must be assumed that this same vowel harmony system was present in the proto-language.

In all of the daughter languages the general rule seems to be that a shift of vowel harmony series is conditioned, as we have said above, by a morpheme, whether a root or an affix, which contains a dominant, [+ATR], vowel. There are, however, almost as many examples of apparently unconditioned [ATR] category shift, where the change of [ATR] series conveys grammatical information. In the Western languages, which are frequently mono-syllabic, and which have clearly suffered the loss of both prefixes and suffixes in the course of their historical development, given the case of a singular-plural pair such as Dinka[3]

(5) da̠k (sg.) dăk^h (pl.) 'pipe' TB 1966:413

it is easy to postulate that the plural had an additional vowel--most probably a suffix--which caused the shift of harmony series and subsequently disappeared. However, what does one do in the case of forms from a southern language such as Nandi which not only tends to be polysyllabic but is also replete with affixes? For example, the word for 'bird' in Nandi is

(6) Primary sg.	Secondary Sg.	Primary pl.	Secondary pl.
tàrɪ́:t	tàrɪ̀:tyɛ́t	tɑ̀rí:t	tɑ̀rì:tík
			NCK 197

Does one say that there are two primary suffixes, a singular with [-ATR] -ɪ:t and a plural with [+ATR] -i:t? While this solution might be made to work here, what does one then do with the word for 'forehead':

(7)	Primary sg.	Secondary sg.	Primary pl.	Secondary pl.
	tɔ́gɔ́c[4]	tɔ́gɛ́:t	tògó:c	tògò:cík
				NCK 197

Obviously one cannot postulate that the second syllable of every word has two allomorphs, one [+ATR], one [-ATR]. Clearly, even in Nandi whatever caused the [ATR] shift has disappeared in the course of time and [ATR] category shift has become morphologized to at least some degree.

As a synchronic solution, this is perfectly adequate; however it does not bring us much forward toward our goal of the reconstruction of the proto-language: from the point of view of historical explanation phonological changes which are morphologically conditioned are never satisfactory. A feeling for pattern regularity led Saussure to postulate laryngeals in Indo-European in order to account for ablaut long before Hittite was discovered and any phonetic justification for them had been found. Within Semitic the historical linguist is forced to accept independent quasi-morphemic status for the vowel patterns but that is because there exists so little variation in the patterns between the Semitic languages that the linguist is not able to recover the more regular past which he knows underlies the uniquely idiosyncratic present.

4. Syncope, umlaut, and consonant assimilation

Proto-Nilotic unity would seem to be, from the point of view of historical linguistics, reasonably recent--probably no more than three or three and a half millenia ago, and there is much which can be recovered through the comparative method. Specifically, the consonantal variations which are found in the realization of clearly cognate roots when one compares languages across the entire family provide us with a clue as to the nature of the lost morphemes.

Before we look at any more individual cognate sets, let us point out that we are not trying, as yet, to account for every individual form in each language. We are, at this point of our investigation of the grammar of Proto-Nilotic, trying to postulate plausible proto-forms which will account for most of the reflexes without trying to explain those places where a given sound does not follow the pattern. Specifically, the proto-forms which we are proposing here are first approximations. They are to be taken only as our best guesses so far of the possible starting points of the phonetic processes which must be postulated for there to be historical explanation.[5]

Let us look at a case in point. Below are listed the forms in Column A for 'cow', and in Column B for 'cows' or 'cattle'. In the Nilotic languages these are felt to be the singular and plural forms of the same noun.

(8)

	A Singular - 'cow'	B Plural - 'cows, cattle'	
Shil	dhyaŋ	dhok	TB
Jur	dhiɛŋ	dhak	Br
Ach	d yaŋ	dyäŋ-i	Cr
Lan	d yaŋ	d ok	Dr
Alur	dhyaŋ	dhok	R
Luo	dhɪaŋ	dhok	Staf
Din	weŋ	ɣɔk	Neb
Nuer	yaŋ	ɣɔk	TB/Ki
Bari	kɪ-t ɛŋ	kɪ-s ʊ k	TB/EBLAV
Maa	ɛnkɪ-t ɛŋ	inki-š u	TM
Lot	nɛ-t ɛŋ	ne-s uŋ	TB
Teso	akɪ-t ɛŋ	aki-t uk-u	TB
Nan	t any	tɪc	TB
Elgeyo	t any (Prim.) t ɛ: ta (Sec.)	tʊ:g-a	TB/GCh
Päk	t any	t i:c	TB/Be
Tatoga	d e d		TB

Let us look at 'cow' first:

We would reconstruct the first consonant of the root as [dh]. In general, the dental-non-dental distinction has been lost in Acholi and Lango, and the same merger has occurred in the East and South and is voiceless since East and South have lost the voicing distinction; always in the South and sporadically in the East. Since the West has retained a voiced-voiceless opposition and here is voiced, the underlying form must have been voiced. Since in the languages which have dental and non-dental d the use of either seems to be unconditioned, then we most postulate the [dh] as underlying in this word. The final consonant is, by inspection, [ŋ] with the only variation occurring in the South. The vowel poses rather more of a problem, but since East and South agree in general in having [ɛ] and there are numerous examples showing this sort of glide + vowel diphthong in the West corresponding to simple vowels in the East and South, we are led to postulate that the underlying vowel was [ɛ] and the Western languages all participated in a shared innovation of what we have termed (section 2 above) breaking. The obvious reconstruction thus would be **dhɛŋ.[6]

In the plural again, for much the same reasons, the initial consonant must have been [dh]--although the [s] in Bari and Lotuho and the [š] in Maasai do pose a problem. The final consonant must have been [k]. The vowel is much more of a problem. Even after we discard Acholi dyäŋi as probably not the inherited plural form but a new one formed from the singular dyaŋ by the addition of a [+ATR] [i], we are left with, on the one hand, the Western languages having o, both [+ATR] and [-ATR], and on the other, the Eastern languages having u, both [+ATR] and [-ATR], while the South has not only ɪ (that is, one can't really say about Päkot since Beech, our only source for the plural, did not record [ATR] variations), but also [c] for the expected [k]. However, if one postulates a unitary cause for both the front vowel and the c for k, one comes up with an older [-ATR][ɪ], causing both fronting of the vowel and palatalization of the consonant, so the Proto-Southern-Nilotic vowel would be [-ATR][ʊ], agreeing with Bari, and the consonant a [k]. Thus, one has both evidence for underlying [ɔ] and underlying [ʊ], both [-ATR] since we do find a variation in [ATR] value and we can take it as established that under such conditions [-ATR] is underlying and [+ATR] conditioned. Considering the plural alone, there is no basis for selecting between [ʊ] and [ɔ] as the inherited vowel. However, since one would like to postulate that the singular and plural are at least tangentially related and the singular has a mid vowel, we therefore would postulate a mid vowel in the plural as well. Thus the plural would seem to reconstruct to **dhɔk.

However, while these are the obvious reconstructions, they are by means satisfying ones in that the singular and plural resemble each other too much to be satisfactory candidates for a case of suppletion, but not enough to be paradigmatically the same root. One could, of course, simply invoke Margaret Bryan's well-known hypothesis of an N/K substratum (Tucker and Bryan 1966: 23f), and shrug one's shoulders at the vowel difference. However, an N/K substratum is intuitively disturbing. If two languages share some feature, this is the result of either their common origin or the outright borrowing of a morpheme from one language by another. Mere juxtaposition of two language groups does not cause the one to get a feature of the other. What is really disturbing is that this N/K variation is almost always part of the root, as Miss Bryan herself notes. It is most interesting to note that the nasal occurs in the singular and the non-nasal in the plural. The borrowing of a condition on root formation would be noteworthy indeed! This sort of variation in a language family which is notorious for the non-predictability of its plural formation on the basis of the singular leads one to wonder if the line of attack by previous linguists has not grabbed the problem at the wrong end.

Let us see if a solution cannot be achieved which is more in line with what is known in general about the directions of historical linguistic change. As general tendencies in the world's languages we know that back vowels front much more often than front vowels back, that [k] goes to [c] and not vice-versa and that stops frequently become nasalized while the change of a nasal stop to an oral one is extremely rare. With these general historical tendencies in mind let us examine the singular and plural which we have reconstructed, **dhɛŋ and **dhɔk. These forms do permit a rational analysis if we decide, on the basis of back vowel vs. front vowel and k vs. ŋ that the plural we have reconstructed is indeed the original root. Such an analysis is not only phonologically desirable but also semantically justifiable--the 'singular' still retains in many of the languages the meaning 'one head of cattle' as well as the meaning 'cow'; that is, the singular was, in origin, a singulative derived from a collective. What then was the nature of the derivational morpheme involved? Well, while it has disappeared, its traces have not. It must have contained a front vowel, in order to account for the fronting of the root vowel, and a nasal, which would account for the nasalization of the root-final consonant.[7] This would suggest a suffixal morpheme of the shape *-ɪn (which is still present in Eastern Nilotic as an affix--a prefix in Maasai, a suffix in Lotuho). The derivational history we would see is:

(9)		
	Base form	*dhɔk
	Singulative formation	*dhɔk + ɪn
	Fronting	*dhɛk + ɪn
	Vowel syncope	*dhɛk + n
	Consonant assimilation	*dhɛŋ

This still leaves unaccounted for the variation between [+ATR] and [-ATR] u and o, and, indeed, the raising of o to u in the Eastern and Southern languages. However, since the [ATR] variation, at least, is sporadic, it is obviously something which happened in individual languages at some time between Proto-Nilotic and today, and we are by no means, at this early stage of our investigations, prepared to even guess about the individual development of each of the languages.

The word for 'cow/cattle' is but one example of many where one would wish to posit what surfaces as the plural in the modern languages as the base form from which the singular is derived. In Hall, et al. (1974) we suggested that it was precisely such a process of derivation of singulars from collectives which accounts for what Tucker and Bryan (1966) have termed 'Reverse Category Shift', that is, a seeming case of a [+ATR] vowel becoming [-ATR] under conditions of inflectional derivation.

5. Breaking

To continue our discussion of vowel processes let us turn to breaking and to the word for 'dog':

(10)			
	Shil	guök	TB
	Jur	guok	Br
	Ach	gwok	Cr
	Lan	gwok	Dr
	Alur	gwok	R
	Luo	guok	TB
	Din	j o	Neb
	Nuer	jiok	TB
	Bari	lʊ-j i -nte	EBLAV
	Lot	xi-ŋ ok	Mur
	Teso	eki-ŋ ok	TB
	Kar	e-ŋ ok	W
	Nan	s es-e	Ho
	Päk	k u:k-î̄y	TB

Proto-Nilogic *gok

Here we assume that the form in the protolanguage was a true singular with a shape something like *gok. The initial consonant poses no real problem, except that it leads one to postuldate a prefix in Dinka, Nuer and Bari which caused the *g to palatalize to j, i.e.

a prefix with a front vowel which also caused the root vowel to front. It is equally obvious that this was a Proto-Nilotic prefix not to be equated with the lu- prefix in Bari (in fact, the apparent prefix in Bari is probably cognate with Proto-Nilotic *lɔ 'wild animal' and we have in Bari a nominal compound which is quite literally 'wild dog' which is its gloss in Bari today). Again the initial ŋ in Lotuxo, Teso and Karamajong argues that the prefix in these languages was not e- or eki- but *en- or *ekin-, that is, some common Eastern Nilotic prefix was involved which resulted in a juxtaposition of -n + k- and assimilation to a nasal velar stop. We have included the Nandi word sese for the sake of completeness but, while g to k to s is not outside the bounds of possible sound change, the fact that the word in Pökot is ku:ki̊y leads us to doubt seriously that the Nandi word is cognate.[8]

The vowel is the feature on which we are focusing our attention. In the Western languages we have a diphthong uo/wo[9] which has fronted in Nuer and lost its first member in Dinka. In the Eastern and Southern languages we have a monophthong o or u (the i in Bari being the result of fronting by the same prefix which palatalized the consonant). One can argue either that we are dealing with an original diphthong which has monophthongized in the East and South or with an original monophthong which has undergone breaking in the Western languages. On the basis of words like 'bird'

(11)	Shil	wɪny-ɔ̨		TB
	Jur	winy-o		W
	Anyuak	wɛ̨ -yo		W
	Ach.	wɪny-ɔ		TB
	Lan	wɪny-o		BC
	Alur	winy-o		BC
	Luo	wɪny-ɔ		TB
	Bari	k-wɛn	(pl.)	Sp
	Lot	x- eny		Mur
	Teso	ek-weny		HL

Proto-Nilotic *wɛny

(where, except in Lotuho, an inherited glide plus vowel is retained in all languages) we believe we are here dealing with a breaking. On the basis of what we now know about Proto-Nilotic, it seems to be the case that inherited e and inherited o, both plus and minus [ATR] broke in the Western dialects under conditions which are still to be determined.

This becomes even more apparent when we compare the word for dog with one of the 'blood' words,

(12)	Shil	kwar-ɔ	'red'	W
	Ach	kwar	'red'	Cr
	Lan	kwar	'red'	Dr
	Alur	ma-kwar-u		G
	Luo	ma-kwar	'red'	Staf
	Nuer	kwar		G
	Bari	k ar-i	'redness'	G
	Maa	o-s ar-gɛ		TM
	Lot	a-x ɔ-tɔ		Mur
	Teso	ao-k o -t		HL
	Nan	k or-oti		Hɔ
	Päk	ki:s-en		Be

Proto-Nilotic *kɔr

'grandfather',

(13)	Shil	kwar-o		Koh
	Ach	kwar-o		Cr
	Din	kɔ-kwar		W
	Nuer	kwar-o	'chief'	W
	Bari	kuar-i:yo	'grandchild'	Sp
	Maa	ɔla-k u -yia		TM
	Lot	a-x o -nyi		EBLAV
	Nan	maca-k or	'grandchild'	Ho
	Päk	ku-k o	'grandparent- grandchild relationship'	Be

Proto-Nilotic *kor

and 'eye'

(14)	Shil	waŋ	Koh
	Jur	ɣɔŋ	Br
	Ach	wa·ŋ	Cr
	Lan	waŋ	Dr
	Alur	waŋ	BC
	Luo	waŋ	Staf
	Din	ny- in	Neb
	Bari	k- ɔŋ-ɛ	EBLAV
	Maa	ɛnk- ɔŋ-ʊ	TB
	Lot	x- ɔny-ɛk	Mur
	Teso	ak- oŋ-u	HL
	Nan	k- ɔ:ŋ	TB
	Päk	k- ɔ:ŋ	TB

Proto-Nilotic *ɔŋ

If one started with the diphthong as inherited it would be difficult to explain why both wa and wo would monophthongize to o; the breaking assumption, on the other hand, poses a less difficult question.

Concerning the ultimate cause of breaking we are, as yet, completely unclear. Three possibilities suggest themselves: First, that the specific type of breaking was conditioned by the quality of the vowel in the following syllable. Perhaps a following u caused o to break to wo whereas a following a caused it to break to wa. The second possibility is that the kind of breaking which resulted was caused by a shift in stress and/or tone (cf. Spanish and Italian) with, perhaps, the position of the affix playing some role, that is, prefixes causing one kind of breaking and suffixes another.

Our third tentative hypothesis is that the breaking to wa occurred with inherently short vowels whereas the breaking to wo occurred with long vowels. This last, at least by itself, is probably the least attractive proposal because at least some breakings co-occur with a change in the final root consonant, which suggests that some additional morpheme was present which caused the change.

Of course, it may be the case that the true historical causes for the different breakings were some combination of all three.

6. Conclusion

In the etymologies which we have presented we have dealt only with nominal stems. This was by design because the verb in the Western languages presents such complexity that to even outline the scope of the problem would require much more space than is available. Suffice it to say that in Dinka, Nuer and Shilluk, breaking seems to be a living morphologically-conditioned process which exhibits great complexity. While not a living process in Acholi or Luo today, it certainly was once one. By means of breaking and lengthening of the stem vowel, and change of [ATR] category, as well as changes in the final consonant of the root there are produced verb tenses; the active vs. passive distinction; the difference of applicative vs. qualitative function; as well as the derivative verbal roots of the frequentative, intensive and directional. (Tucker 1955 is the most detailed presentation of this.)

Although we have found considerable evidence for reconstructing plus and minus [ATR] categories as a property of the proto-language, we have found absolutely no evidence, other than perhaps the different breaking phenomena, to suggest that there was distinctive vowel length in Proto-Nilotic, despite the fact that vowel length plays a major lexical and morphological role in many of the daughter languages.

There is much that we have learned about Proto-Nilotic that we have not had space enough to discuss. There are also many questions that remain, for example the origin of the s's which occur in Luo and in the Eastern and Southern languages; some would seem to be derived from Proto-Nilotic k or g but the evidence is far from clear.

Footnotes

*We would like to thank Mark Feinstein, Bernd Heine, Samuel Levin, and Robert Vago for their comments on a previous version of this paper. We are also grateful to Chet Creider for his many valuable comments and suggestions and most especially for his enthusiastic interest in our project. Coming as it does from someone who has detailed and intimate knowledge of several of these languages, his encouragement has meant a great deal to us.

This is primarily a work of library research and, as such, it would not have been possible without the skill, patience and perseverance of the members of the Interlibrary Loan Department of the Paul Klapper Library of Queens College. We would like to take this opportunity to express our gratitude to the Director of the Interlibrary Loan Department, Mrs. Mimi B. Penchansky, and to her able assistants, Mrs. Ruth Hollander and Mrs. Beatrice S. Sheiken.

[1] In our citation of forms we have attempted to follow our sources exactly; however, we have normalized the orthography of consonants in our sources to the Rejaf Conference conventions (cf. Tucker 1971:624f.) wherever it was possible to do so unambiguously. We therefore represent the interdental series of stops as [th], [dh], [nh]; we use [ny] for the palatal nasal. In the case of vowels we have not altered our sources with the exceptions of Westermann (1912) where we have substituted IPA symbols according to the values given in his table on p. 2ff., and also in the case of Tucker and Bryan where we have substituted ɑ̲ for their a̲ to represent the [+low, +ATR] vowel of Southern Nilotic. The exact source of each form which we cite is indicated by an abbreviation following it; these abbreviations are given to the left of the bibliographical citation of each work in the Reference section which follows.

[2] It is worth noting as a historical aside that priority for the recognition of voice quality as a phonologically significant phonetic event would seem to belong to Fr. J. P. Crazzolara, F. S.C.J. who first pointed this out in his *Outlines of a Nuer Grammar* (1933:2f.). This phenomenon was first drawn to the attention of linguists in general by A. N. Tucker in his report "The function of voice quality in the Nilotic languages" at the II International Congress of Phonetic Sciences (1936).

[3] Here we are following Tucker and Bryan (1966) exactly in their phonetic representation: underlined vowels are [-ATR], non-underlined are [+ATR]. In Dinka--as in Nuer and Shilluk--voice quality (the direct concomittant of tongue root position) and tongue body placement seem to vary absolutely independently of one another (cf. Tucker and Bryan 1966:402f.--we have confirmed their comments there from our own informant work on two dialects of Dinka). Thus in Dinka one may find both "open" and "closed" o̲ as both plus and minut [ATR] (i.e. [ɔ], [o], [ɔ̲], [o̲]) and so too with the other vowels. Neither tongue root position/voice quality nor tongue body height and placement seem to equate in any simple way in the Nilotic languages with the categories "tense" and "lax" which have been used for describing Western European languages (cf. Stewart 1971:198ff. for a similar disclaimer for West African languages). It is also worthy of note that vowel length is a third, completely independent variable.

[4] In Nandi-Kipsigis-Elgeyo (but not in Päkot) [-coronal] consonants voice automatically in intervocalic position. We are following the convention established by Tucker and Bryan of indicating this change in the orthography.

[5] Our ultimate goal in our historical study of the Nilotic languages is, of course, thoroughgoing _explanation_, not piecemeal lists. That is, here in this paper we are presenting tentative Proto-Nilotic roots the exact shapes of which we cannot as yet defend. Our goal is to present unitary defensible roots for each reconstructable word. In order for a statement of linguistic change in Nilotic to reach explanatory adequacy there are two major preliminary steps which must be completed:

i. The data base throughout the family must be really sound. At present it is only the data in the various works of Tucker, Tucker and Bryan, and Crazzolara, and perhaps Spagnolo which is credible on simple terms of observational adequacy. All of the other authors, without exception, tend to be casual about vowel length and quality and cavalier about tonal distinctions (when not utterly oblivious of their existence).

ii. There must be a study for each of the daughter languages of both the morphophonology (including, necessarily, internal reconstruction) and the morphosemantics, using comparative evidence to establish for each the morphological categories which in it are more or less covert but which in other, closely related, languages find overt expression.

[6] This is a starred starred-form. That is to say, the star nearest the form indicates that it is a reconstructed form, the star preceding this that it is an incorrect reconstruction.

[7] The interchange between root final oral and root final nasal stops is an active morphological process in Dinka and Shilluk today. As it is realized in these languages, the oral stops become homorganic nasals when they are root final on nouns which are followed by possessives, adjectives, or noun modifiers (see Tucker and Bryan 1966:407). In Luo and Adhola an analogous and almost certainly historically related process occurs whereby under similar syntactic conditions final nasal stops become nasal plus homorganic voiced oral stop clusters (see Tucker and Bryan 1966:407f.). In both of these cases the triggering mechanism was quite clearly the relativizer *_na_. The morpheme which we postulate below which caused the change from *_dhεk_ to *_dhεŋ_ was certainly _not_ the relativizer but we believe it is reasonable to assume that the historical phonological process was the same.

[8] _Sese_ is an example of the sort of maddening problems which face the historical linguist. In the discussion following our presentation of this paper, Chet Creider volunteered the information that Kipsigis (which is almost identical with Nandi) has the word _ŋok_ 'selfish person' which is probably cognate with the Proto-Nilotic word for 'dog' and the semantic shift of which is certainly well within the bounds of possibility. He said he had always assumed that _sese_ was borrowed from Gusii _esēse_ 'dog'. However, Derek Nurse, who has done a great deal of work on Gusii, informed us that _esēse_ does not fit the phonological pattern of Gusii and he had always assumed it was a Nilotic loan in Gusii. While it is, of course, possible to postulate the steps whereby P-N *_gok_ became Proto-Kalenjin *_kuk_ (cf. the form in Päkot), and then _sese_ in Nandi and Kipsigis, there is no compelling evidence available to show that in fact this _did_ happen.

[9] Our sources vary considerably on whether a given word has *uo* or *wo*, *ie* or *ye*. From the descriptions of the various languages it is not clear to us that there is any case where there is a contrast between *u* and *w* or *i* and *y* as the onglide of the diphthong. We suspect that such differences may exist for some languages but that, if they do, they are interrelated with other facts of voice quality and tongue height in the articulation of the following vowel. In this paper we are assuming that, whether *uo* and *wo*, *ie* and *ye* represent orthographic variations of the same phonetic reality or are phonologically significant, the historical process of which they are the end product was the same and hence any distinction between them can be ignored for our purposes.

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Proceedings of the Sixth Conference on
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Lenis Stops and the Origins of Volta-Comoe Consonant Mutation

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1. Introduction

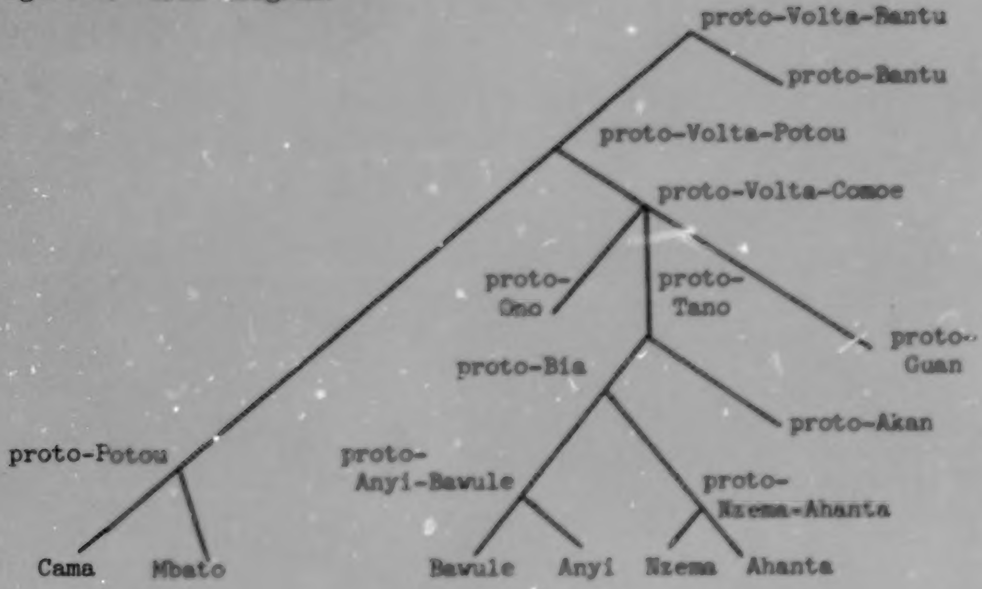
It has recently been shown (Stewart 1973a) that the nonlenis/lenis (fortis/lenis) distinction which is displayed by both the unvoiced and the voiced stops in Cama (Kyama, Ebrié) appears to be a survival from the latest common ancestor of the Bantu languages and the Volta-Comoe (Greenberg's (1963) 'Akan') languages, and that the distinction appears to have been lost in all the Bantu languages and in all the Volta-Comoe languages, but not, in the case of the Volta-Comoe languages, without first playing an important role in the conditioning of major soundshifts.

The major soundshifts postulated in pre-Volta-Comoe (more precisely, in Volta-Potou-to-Volta-Comoe; see below) are as follows (Stewart 1973a:21): (1) The (oral) unvoiced fortis stops become continuants, (2) The (oral) voiced fortis stops become unvoiced, (3) The oral lenis stops, both unvoiced and voiced, become fortis.

The purpose of this paper is to show that if these postulated soundshifts are reexamined in the light of the systems of morpheme-initial consonant mutation found in Nzema and other languages/dialects in the Bia subsubgroup of the Tano subgroup, in which morpheme-initial unvoiced fortes and voiced fortes commonly mutate to voiced fortes and voiced lenes respectively when not word-initial, it appears that in the case of the original (oral) voiced fortes and oral voiced lenes, the soundshifts did not, after all, occur in all positions and thereby completely eliminate the fortis/lenis distinction, but occurred in word-initial position only, and thereby gave rise to a consonant mutation system in which the fortis/lenis distinction played an important part.

The ancestral interrelationships which the relevant languages/dialects are here postulated as having may be represented by a tree diagram as in Figure 1.

Figure 1. Tree diagram.


proto-Volta-Bantu
proto-Bantu
proto-Volta-Potou
proto-Volta-Comoe
proto-Gno
proto-Tano
proto-Guan
proto-Bia
proto-Akan
proto-Potou
proto-Anyi-Bawule
proto-Nzema-Ahanta
Cama
Mbato
Bawule
Anyi
Nzema
Ahanta

Note 1: The bottom of the diagram represents the present time; the heights of the various proto-languages above the bottom, however, are not intended to represent relative time-depths. Very roughly, left-to-right along the bottom corresponds to west-to-east.

Note 2: It will be seen that the latest common ancestor of the Bantu languages, the Volta-Comoe languages and Cama is here called proto-Volta-Bantu. If Greenberg's classification is correct, this is to be identified with proto-Niger-Congo, but the writer suspects that it may not in fact go back quite so far (see Stewart 1973a:2).

The writer has investigated several of the Bia languages/dialects at first hand, though his data on Nzema is drawn from the work of others. He reported some time ago that "there remain in Ba[w]ule a few traces of a system of consonant mutation which is still vigorous in closely related languages or dialects such as Nzema" (Stewart 1956:364). He would now sum up the Bia situation by saying that the proto-Bia mutation system appears to have survived with extraordinarily little change in Nzema and with relatively little change in Ahanta, but that in Bia-to-Anyi-Bawule it apparently decayed considerably, becoming very much like the systems found in the various Anyi dialects examined, and that in Anyi-Bawule-to-Bawule it apparently decayed still further, to the point where it no longer was a mutation system, even though a few traces of it remained.

Under the circumstances it is natural to take Nzema as the sole representative of the Bia languages for the present purpose. Fortunately, a very detailed account of Nzema consonant mutation as it affects root morphemes in a variety of grammatical circumstances is available in Chinebuah (1970); the account given below is based primarily on this, but also takes into consideration Welman (1925).

The system of transcription used here is that of Stewart (1973a); the main points to be noted are (i) that an initial apostrophe indicates lenisness, and (ii) that i̲,u̲,j,y,šʸ are I.P.A. ɩ,ɵ,ɟ,ʝ,ç respectively and žʸ is the voiced counterpart of I.P.A. ç. The conventions adopted in the formulation of the P-rules follow those of Stewart (1973a) closely; it is important to note that all the binary features attributed to segments are strictly paradigmatic, quasi-paradigmatic features such as 'Vocalic' being disallowed.

2. Consonant mutation in Nzema

Mutation affects morpheme-initial consonants, and the following three mutation grades are recognized (though Chinebuah numbers the last two in the reverse order):

1. Unmutated[1] word-initial.
2. Mutated after a vowel.
3. Mutated after a homorganic nasal consonant. (It should be noted that a morpheme-initial consonant is never preceded by any consonant other than a homorganic nasal.)

The phonological conditioning, however, is not quite as regular as this suggests; for instance, in certain tense forms such as the present, the stem regularly takes Grade 1, while in certain others such as the past it regularly takes Grade 2, even though in these tense forms the stem may be either word-initial or preceded by a vowel, e.g.

Present: Grade 1	Past: Grade 2	Cf. Perfect: Grade 2
kofi ba Kofi comes	kofi 'ɣali̲ Kofi came	kofi ɛ'ɣa Kofi has come
ɔba he comes	ɔ'ɣali̲ he came	yi̲'ɣa he has come

Such deviations are evidently to be explained in part at least in terms of analogical simplification; it would appear, for instance, that in the present tense the stem-initial consonant may at one time have alternated between Grades 1 and 2 according to whether or not the stem was word-initial, and that the alternation may have been later eliminated analogically by the use of Grade 1 to the exclusion of Grade 2.

Chinebuah recognizes five types of consonant mutation, which with the help of the fortis/lenis distinction, which is not part of Chinebuah's framework, may be summed up as follows:

1. Z-mutation, in which Grade 1 is an unvoiced fortis and Grades 2 and 3 are the corresponding voiced fortis; where Grade 1 is a dorsal stop or affricate, however, there is no Grade 2; and, according to Welman (1925),

where Grade 1 is t, Grades 2 and 3 are not d but ḍ.

2. H-mutation, in which Grade 1 is an unvoiced fortis dorsal stop or affricate, Grade 2 is the corresponding continuant, and there is no Grade 3.
3. B-mutation, in which Grade 1 is a nondorsal voiced fortis, Grade 2 is an oral voiced lenis, and Grade 3 is a nasal voiced lenis.
4. P-mutation, in which Grade 1 is an unvoiced or voiced fortis and Grades 2 and 3 are identical to it; except in the case of kp and tp , however, unvoiced fortes take P-mutation only in very restricted grammatical circumstances; and nondorsal voiced fortes take P-mutation in Grade 3 only in very restricted grammatical circumstances.
5. R-mutation, in which Grade 1 is an oral or nasal voiced lenis and Grades 2 and 3 are identical to it, except that where Grade 1 is n Grade 2 is l̃.

It should be noted, however, (i) that Chinebuah looks upon his R-mutation, like his P-mutation, as strictly a zero mutation, and allocates n → l̃ to his B-mutation; and also (ii) that he allocates those voiced fortes which display zero mutation not to his P-mutation but to his R-mutation.

For the present purpose Chinebuah's Z- and H-mutations, which are clearly complementary, are treated as a single type, designated Z/H; historically, as will be seen, it appears that Chinebuah's H-mutation arose as a result of voiced fortis dorsal stops and affricates in Grade 2 becoming first continuant and then unvoiced. This gives two nonzero mutation types, Z/H and B, and two zero (strictly, zero or near-zero) mutation types, P and R. The main section of this paper shows the mutations of the two nonzero types, Z/H and B, to be derivable by natural P-rules from the voiced fortis (oral) stops and voiced lenis oral stops respectively of proto-Volta-Potou.

The unvoiced P-mutations appear to be derivable by natural P-rules from the unvoiced stops, both fortis and lenis, of proto-Volta-Potou; see the section on the contrast between Z/H-mutation and P-mutation below. The voiced P-mutations, on the other hand, appear to be the result of analogical changes from B-mutations; see the section on the emergence of the voiced P-mutations below. The R-mutations appear to be derivable by natural P-rules from the lenis continuants and nasals of proto-Volta-Potou; they will not be discussed further except in connection with the n → l̃ mutation.

The mutations of the two nonzero types (including four theoretical dorsal B-mutations which are presumed to have been replaced analogically with P-mutations in all circumstances), and the proto-Volta-Potou voiced stops from which they are derived in the main section of this paper, are as follows:

Number	Type	Proto-Volta-Potou	Grade 1	Grade 2	Grade 3
1	Z/H	b	f	v	v
2	Z/H	d	t	ḍ	ḍ
3	Z/H	jž	s	z	z
4	Z/H	g	k	h	g
4a	Z/H	g	cš	š	jž
5	Z/H	g^w	k^w	h^w	g^w
5a	Z/H	g^w	cšy^w	šy^w	jžy^w
6	B	'b (~m)	b	'ɣ	m
6a	B	'b (~m)	b	w	m
7	B	'd (~n)	d	l	n
8	B	'g	g	*'ɣ	g
8a	B	'g	jž	*y	jž
9	B	'g^w	g^w	*w	g^w
9a	B	'g^w	jžy^w	*y^w	jžy^w

A number of points must be noted here. Firstly, mutations 4a, 5a, 8a and 9a are merely variants of mutations 4, 5, 8 and 9 respectively; they have arisen as a result of what appears to be a Volta-Comoe-to-Tano soundshift 'palatalizing' dorsal consonants before high front vowels. Secondly, mutation 6a is merely a variant of mutation 6; rounded 'ɣ is disallowed, with the result that w occurs to the exclusion of 'ɣ before round vowels. Thirdly, as the oral/nasal alternations shown in the proto-Volta-Potou column are intended to indicate, the oral/nasal alternations in the nondorsal B-mutations between Grades 1 and 2 on the one hand and Grade 3 on the other appear to go right back to proto-Volta-Potou (see Stewart 1973a:7). In the derivation below, therefore, mutations 4a, 5a, 6a, 8a, and 9a are disregarded, and no P-rule is formulated to account for the nasality which characterizes Grade 3 in the nondorsal B-mutations.

3. The proposed derivation of the Nzema nonzero mutations from the voiced oral stops of proto-Volta-Potou

The Nzema nonzero mutations, in so far as they are derivable from the voiced oral stops of proto-Volta-Potou without recourse to the postulation of analogical simplification, are derivable by three P-rules in the Volta-Potou-to-Volta-Comoe (VP-VC) bundle, two in the Volta-Comoe-to-Tano (VC-T) bundle, and six in the Tano-to-Bia (T-Bi) bundle. The derivation is presented in summary form in the first instance in order to give an overall picture. It should be noted that the rule numbers differ from those of Stewart (1973a, 1973b).

	Z/H-mutation					B-mutation			
	1	2	3	4	5	6	7	8	9
Proto-Volta-Potou	b	d	jž	g	g^w	’b	’d	’g	’g^w
	b	d	jž	g	g^w	’b	’d	’g	’g^w
	b	d	jž	g	g^w	m	n	’g	’g^w
VP-VC. 3.	p	t	cš	k	k^w				
	b	d	jž	g	g^w				
	b	d	jž	g	g^w				
VP-VC. 4.						b	d	g	g^w
						’b	’d	’g	’g^w
						m	n	’g	’g^w
VP-VC. 5.							d		
							l		
							n		
Proto-Volta-Comoe	p	t	cš	k	k^w	b	d	g	g^w
	b	d	jž	g	g^w	’b	l	’g	’g^w
	b	d	jž	g	g^w	m	n	’g	’g^w
VC-T. 1.			s						
			z						
			z						
VC-T. 2.	f								
	b								
	b								
Proto-Tano	f	t	s	k	k^w	b	d	g	g^w
	b	d	z	g	g^w	’b	l	’g	’g^w
	b	d	z	g	g^w	m	n	’g	’g^w
T-Bi. 1.	f	t							
	v	δ							
	v	δ							
T-Bi. 2.						b			
						’g			
						m			
T-Bi. 3.				k	k^w	b		g	g^w
				ɣ	$ɣ^w$	’ɣ		’ɣ	w
				g	g^w	m		’g	’g
T-Bi. 4.								g	g^w
								’ɣ	w
								g	g^w

	1	2	3	4	5	6	7	8	9
T-Bi. 5.				k	k^w				
				h	h^w				
				g	g^w				
T-Bi. 6.		t							
		ḏ							
		ḏ							
Proto-Bia	f	t	s	k	k^w	b	d	g	g^w
	v	ḏ	z	h	h^w	ʼɣ	l	(ʼɣ)	(w)
	v	ḏ	z	g	g^w	m	n	g	g^w

The first two of the three VP-VC rules in the above derivation result of course from the revision of the three rules previously proposed (Stewart 1973a:21) to cover the major soundshifts in the bundle in question; these three rules, which have already been quoted in the Introduction, are now replaced with the following four (the first two of which affect only unvoiced consonants and thus play no part in the above derivation):

VP-VC. 1.
C
-Lenis
-Voiced
<+Labial>

→ +Continuant
<+Dental>

This rule states that in all positions unvoiced fortis stops are replaced with the corresponding continuants, except that labial p is replaced with labiodental f.

VP-VC. 2.
C
-Voiced
-Continuant

→ -Lenis

This rule states that unvoiced lenis stops become fortis in all positions.

VP-VC. 3.
R C
+WdBdy -Lenis

→ -Voiced

This rule states that voiced fortis stops become unvoiced in word-initial position.

```
VP-VC. 4.              R           C
                       +WdBdy      +Voiced
                                   -Continuant
                                   -Nasal

                 →                 -Lenis
```

This rule states that voiced lenis oral stops become fortis in word-initial position.

The only remaining VP-VC rule is a revised version of one that has already been formulated (though not specifically allocated to VP-VC) in an account of final light syllables in disyllabic roots in Akan (Stewart 1973b P-rule Ak. 3); it is as follows:

```
VP-VC. 5.   ____       V  C        V
                          +Coronal
                          -Dorsal
                          +Voiced
                          +Lenis

                  →       +Lateral
```

It states in effect that invervocalic ’d,n are replaced with l,l̃ respectively. The only difference from the earlier formuation is that the consonant is specified as +Lenis; the fortis/lenis distinction was not found to be relevant in the earlier study, in which root-initial consonants were disregarded.

This rule accounts not only for the change of the B-type mutation d ~ ’d ~ n to d ~ l ~ n but also for the change of the R-type (zero) mutation n ~ n ~ n to (nonzero) n ~ l̃ ~ n.

The first of the two Volta-Comoe-to-Tano rules unconditionally replaces cš,jž with s,z respectively, and the second unconditionally replaces p with f. The second rule, as well as a less satisfactory version of the first, were first presented as supporting evidence for the validity of the Tano subgroup in Stewart (1966:44). The original version of the first rule unconditionally replaced ts with s; no voiced counterpart was mentioned, as it had been assumed that present-day z, which occurs only in Mutation Grades 2 and 3, was to be explained by a Tano-to-Bia rule which voiced noninitial unvoiced obstruents in certain circumstances; and the proto-Volta-Comoe sound had been assumed to be alveolar before Painter (1967:28) found the sound in the word for "water" (corresponding to Nzema nzʋle, Akan nsʋo (Asante dialect), nsu (Fante and Akuapem dialects)) to be "a [voiceless] blade-alveolar affricate with an extensive place of articulation both at and somewhat behind the teeth ridge" in 28 out of 31 Guan idiolects investigated. With regard to the second rule, the writer failed to note in 1966 that the p was derived not only from proto-Volta-Potou ’p but also from proto-Volta-Potou (fortis) b; for examples of both these derivations see Stewart (1973a:26 and 28 (P-rule VC.T. 2 examples 1 and 18).

The two rules explain, of course, how it comes about that Z/H-type mutation is found not only where Grade 1 is an unvoiced stop but also where it is s or f.

The six Tano-to-Bia rules are as follows:

T-Bi. 1.	R -WdBdy	C -Dorsal +Voiced -Continuant -Lenis
→		+Continuant +Dental

This rule states in effect that in word-medial position, and thus in Grades 2 and 3 but not in Grade 1, the fortis stops b,d are replaced with the fortis continuants v,ð respectively.

T-Bi. 2.	C -Continuant -Nasal -Lateral +Lenis
→	-Labial +Dorsal

This rule states that a lenis nonlateral oral stop becomes dorsal and nonlabial if it is not dorsal and nonlabial already. The only sound affected is ’b, which in the mutation system occurs only in Grade 2; it becomes ’g and thereby merges with existing ’g.

T-Bi. 3.	R +WdBdy	V C +Dorsal +Voiced -Nasal
→		+Continuant

This rule states that after a word-initial vowel, an oral voiced dorsal stop, whether fortis or lenis, is replaced with the corresponding continuant. Its effect on the mutation system is to replace g,jž,g^{w},$j\check{z}^{yw}$,’g,’j,$’g^{w}$,$’j^{yw}$ with ɣ,ž,$ɣ^{w}$,$\check{z}^{yw}$,’ɣ,y,w,y^{w} respectively in Grade 2. (The rule in fact replaces the affricates jž etc. with žž etc., but as double syllable-initial consonants are disallowed they are automatically reduced to ž etc. The rule also replaces $’g^{w}$ with $’ɣ^{w}$, but, as has already been noted, this is disallowed and automatically replaced with w.)

T-Bi. 4. C
-Continuant
-Nasal
-Lateral

→ -Lenis

This rule states that lenis nonlateral oral stops are replaced with the corresponding fortis stops. The only sounds affected are ʼg,ʼj,ʼgʷ,ʼjʸʷ, which in the mutation system occur only in Grade 3; they are replaced with g,jž,gʷ,jžʸʷ respectively. (The rule in fact replaces ʼj etc. with j etc., but as unaffricated fortis palatal stops are disallowed these are automatically replaced with jž etc.)

T-Bi. 5. V C
+Dorsal
-Lenis
⟨-Coronal
+Continuant⟩
——
→ -Voiced
⟨-Dorsal⟩

This rule states that after a vowel a voiced fortis dorsal becomes unvoiced, and that if it is noncoronal and continuant it also becomes nondorsal. Its effect the mutation system is to replace ɣ,ž,ɣʷ,žʸʷ with h,š,hʷ,šʸʷ respectively in Grade 2.

T-Bi. 6. C
+Coronal
+Dental

→ -Continuant

This rule states that a dental coronal continuant is replaced with the corresponding stop. The only sound affected is ð, which in the mutation system occurs only in Grades 2 and 3; it is replaced with d̪.

The most important effect of the Tano-to-Bia rules on the mutation system is the replacement of the stops with continuants (i) by T-Bi. 1 in Grades 2 and 3 in the case of the nondorsals, and (ii) by T-Bi. 3 in Grade 2 in the case of the dorsals. There is no direct evidence of the stop d having been replaced with the continuant ð, since present-day Nzema has the stop d̪ and all the other Bia languages/dialects examined also have stops; the dental articulation of the present-day Nzema sound, however, could not be so naturally explained without the postulation of an earlier ð. (The distinction between d and d̪ is not mentioned by Chinebuah (1970), but is reported on at some length by Welman (1925:13 and 15-16)).

The postulation of a stage (after T-Bi. 3) at which the fortis continuant ɣ was in contrast with the lenis continuant ’ɣ might conceivably appear implausible to some, but this contrast does in fact occur in present-day Ewe, which, like Nzema, is spoken in southern Ghana; see Ansre (1961:15) and Stewart (1973a:43-4). (In Ewe, ɣ,’ɣ are orthographically 'h,ɣ' respectively.)

In the case of T-Bi. 3 the formulation of the context in which the change occurs, namely after a word-initial vowel, calls for some comment. The full facts, which T-Bi. 3 admittedly fails to capture, are perhaps covered most simply by saying that the change takes place in initial position in root morphemes, but the writer remains unconvinced of the legitimacy of any reference to the grammatical circumstances. The formulation as it stands does not account for instance for the fact that there is not a stop but a continuant in the second part of the reduplicated form cši̲šɛ of cšɛ "share"; it is necessary to postulate an analogical extension of the continuant to all contexts requiring Grade 2.

Three of the six Tano-to-Bia rules account not only for changes in the consonant mutation system but also for changes in the final light syllable system. In his 1973b study of final light syllables in a number of Volta-Comoe languages the writer derives Nzema kɛ ~ ke from proto-Tano bɛ ~ be as follows:

Proto-Tano (1973b).	bɛ	~ be
T-Bi (1973b). 3.	gɛ	~ ge
Bi-Nz (1973b). 2.	kɛ	~ ke

That study, however, takes no account of the fortis/lenis distinction, which, as has already been noted in connection with VP-VC. 5 above, was not found to be relevant. Now the only oral consonants postulated in final light syllables in proto-Tano (1973b) are b and l, and in the light of the present study of consonant mutation it appears (i) that the l is derivable by VP-VC. 5 from proto-Volta-Potou ’d, and (ii) that the labial consonant was ’b as a dorsal is then derivable from it by T-Bi. 2. The Nzema fortis unvoiced dorsal k thus appears, somewhat startlingly, to be derived from a proto-Tano lenis voiced labial ’b. The Tano-to-Bia rules of the present study, however, numbers 2 and 5 of which are revised versions of the rules allocated to Tano-to-Bia and Bia-to-Nzema respectively in the earlier study, give the correct output as they stand:

	Initially in final light syllable	Cf. initially in root			
		Grade 2			Grade 3
Proto-Tano	’b	’b	’g	g	’g
T-Bi. 2.	’g	’g			
T-Bi. 3.		’ɣ	’ɣ	ɣ	g
T-Bi. 4.	g				
T-Bi. 5.	k			h	
Proto-Bia	k	’ɣ	’ɣ	h	g

The cost of the whole derivation from proto-Volta-Potou to

Nzema, in terms of P-rules not yet found to be necessary to account for data outside the consonant mutation system, is thus extremely modest; there are only three such rules, namely the three Tano-to-Bia rules which change the value of the feature Continuant, and only one of these rules changes the value of a second feature.

4. The contrast between Z/H-mutation and P-mutation

The above derivation offers an explanation of what is perhaps the most striking aspect of Nzema consonant mutation, namely that where a root has an initial unvoiced fortis in its synchronically unmutated form (i.e. in its Grade 1 form),[2] it is not always possible to predict from its phonological structure whether it will take Z/H-mutation (a nonzero mutation) or P-mutation (a zero mutation); tu "dig", for instance, has the reduplicated form tud̲u (Z/H-mutation), whereas ti̲ "tear" has the reduplicated form ti̲ti̲ (P-mutation). Whereas the Z/H-mutation appears to be derived from proto-Volta-Potou voiced fortis stops, as has been seen, the P-mutation appears to be derived from proto-Volta-Potou unvoiced stops, both fortis and lenis; the derivations of the examples quoted illustrate:

	Z/H-mutation		P-mutation	
Proto-Volta-Potou	du	dudu	’ti̲	’ti̲’ti̲
VP-VC. 2.			ti̲	ti̲ti̲
VP-VC. 3.	tu	tudu		
Proto-Volta-Comoe, proto-Tano	tu	tudu	ti̲	ti̲ti̲
T-Bi. 1.		tuðu		
T-Bi. 6.		tud̄u		
Proto-Bia, Nzema	tu	tud̲̄u	ti̲	ti̲ti̲

The main explanation would appear to be, then, that VP-VC. 2 and VP-VC. 3 between them (the order in which they are given here is arbitrary) produced a merger in Grade 1 (the synchronically unmutated form) but not in the other grades.

The contrast between the two mutations in Nzema, it should be noted, has a very limited grammatical distribution; Chinebuah (1970:72-4) reports it as generally operating only in the reduplicated form of the verb root, though he does give one minimal pair showing it to be in operation in the verbal noun (p. 84). Thus ti̲ "tear" or "pluck", for instance, which takes P-mutation in its reduplicated form, takes Z/H-mutation in the verbal noun (ɛd̲i̲lɛ "plucking"; Grade 2) and in the present negative (n̲d̲i̲ "does not pluck"; Grade 3); see Chinebuah (1970:83). The obvious explanation is the analogical replacement of P-mutation with Z/H-mutation in most grammatical circumstances in the case of those unvoiced consonants which take either Z/H-mutation or P-mutation in reduplication. With regard to the restriction to those unvoiced consonants which are unpredictable in reduplication, it should be noted that kp and tp, which, unlike the other unvoiced consonants, apparently take only P-mutation in reduplication, take P-mutation in many (though not all) grammatical circumstances in which the other unvoiced consonants take only Z/H-mutation; see Chinebuah (1970: 72-4).

One would of course hope eventually to be able to quote comparative series of items which would demonstrate (i) the correspondence of Nzema verb roots taking Z/H-mutation in reduplication to reflexes in other languages of proto-Volta-Bantu verb roots with initial voiced fortes, and (ii) the correspondence of Nzema verb roots taking P-mutation in reduplication to reflexes in other languages of proto-Volta-Bantu verb roots with initial unvoiced fortes or lenes. The number of Nzema verb roots at present available for comparison, however, is very limited; Chinebuah gives only the following:

Z/H-mutation			P-mutation		
tu	tud̲u	dig	ti̲	ti̲ti̲	tear, pluck
su	suzu	measure	si	sisi	build
			sũã	suosũã	tear
kã	kĩhã	say	ka	ki̲ka	bite
cšɛ	cši̲šɛ	share	cši̲	cši̲cši̲	bind

Of these, only two have been found to have apparent cognates in either the Bantu languages or the Potou Lagoon languages: (1) tu "dig", which is almost certainly cognate with Akan tu "dig" or "pull", which in turn appears to be cognate with the reflexes in the Bantu languages of Guthrie's Common Bantu *-dų̀t- "pull", and (ii) sũã "tear", which is probably cognate with Cama tuɛ "tear in pieces", though in this case not all the sound correspondences can be shown to be regular. The first example confirms the derivation proposed for the Z/H-mutation, the Common Bantu representation having d and not t. The second example confirms one of the two derivations proposed for the P-mutation, namely from proto-Volta-Potou unvoiced fortis stops: where the consonant is s in Nzema the P-mutation would sometimes be derived from proto-Volta-Potou t, which survives intact in present-day Cama but which is replaced with s in all positions by VP-VC.1.

5. The emergence of voiced P-mutations

As was noted earlier, the voiced P-mutations appear to be the result of analogical changes from B-mutations. The purpose of the present section is to indicate the main analogical changes which it is necessary to postulate, and to demonstrate their plausibility. The point of departure for the changes is of course not only the attested nondorsal B-mutations but also the theoretical dorsal B-mutations as generated by the above derivation, which are presumed to have been replaced with P-mutations in all circumstances.

In the case of the dorsals the postulated analogical change is from g ~ *'ɣ ~ g etc. to g ~ g ~ g etc. Two factors may be suggested as having probably contributed to precipitating this change.

Firstly, the replacement of ’b with ’g by T-Bi. 2 would have meant (i) the neutralization in Grade 2 of the contrast which is manifested as b/g in Grade 1, and (ii) a consequent incentive to avoid that neutralization by making Grade 2 the same as Grade 1 by analogy with the existing zero mutations. The significance of this factor would appear to be confirmed by the fact that except in the case of ba "come", Grade 2 is also the same as Grade 1 in all verb roots which have initial b in Grade 1.

Secondly, T-Bi. 4, by replacing ’g etc. with g etc., made Grade 3 the same as Grade 1; this was unparalleled elsewhere in the nonzero mutations but not of course in the zero mutations, and would naturally have favoured the analogical extension of zero mutation to Grade 2.

As for the nondorsals, it has just been seen that all verb roots but one which have initial b in Grade 1, just like all those which have initial dorsals in Grade 1, display zero mutation in Grade 2. This leaves the other nondorsal, namely d, as the only one of the voiced fortes which generally displays the regular nonzero B-mutation in Grade 2 in verb roots. It is not satisfactory, however, to discuss d without taking into consideration the fact that its nasal counterpart n also displays nonzero mutation in Grade 2, the Grade 2 forms of d and n being l and l̃ respectively; it will be recalled that in the above derivation P-rule VP-VC. 5 replaced intervocalic ’d,n with l,l̃ respectively, thereby causing a small spill-over of nonzero mutation from the B-type (displayed by d) to the R-type (displayed by n).

Even d,n display zero mutation in Grade 2 in certain very restricted circumstances; according to Chinebuah (1970:74-5), they display zero mutation in the reduplicated forms of CV and CVCV roots but not in those of CVV roots, e.g.

Unreduplicated		Reduplicated		Example from page
dɔ	weed	du̱dɔ	weed	83
die	receive	dĩelie	receive	81
nĩ̱ã	look	nĩ̱ɛ̃lĩ̱ã	look for	81

Almost certainly the explanation of the analogical change here is that l,l̃ occur with great frequency, and to the exclusion of d,n, in intervocalic position within roots, so that the reduplicated forms of CV roots with initial d or n, if they displayed nonzero mutation, would be subject to confusion with CVCV roots with medial laterals. The survival of nonzero mutation in the reduplicated forms of CVV roots is explained by the nonexistence of CVVCVV roots.

Chinebuah (1970:75 and 83) also notes one context in which he considers d to display zero mutation in Grade 3, namely "plural forms of singular nouns with a vowel prefix (e.g. ɛḏãlɛ/ṉḏãlɛ [examples retranscribed; dentality not of course shown in original; J.S.] 'cloth')." This, however, as will be clear in the light of the phonetic difference between the d of Grade 1 and the ḏ of Grades 2 and 3 which he does not recognize, is rather a matter of a Z/H-mutation in which Grade 1 (which would of course be t) is not required, the singular and plural requiring Grades 2 and 3 respectively.

6. Conclusion

The postulation of distinctively lenis stops in proto-Volta-Bantu thus provides, as a bonus, a highly econominal explanation of the systems of consonant mutation found in Nzema and other languages/dialects of the Bia group: the Nzema system, which appears to have been inherited virtually unchanged from proto-Bia, is highly complex, but can nonetheless be derived almost in its entirety from the postulated proto-Volta-Bantu consonant system by an ordered set of articulatorily plausible P-rules of which all but three account for data outside the consonant mutation system as well as within it.

This of course strengthens the case for postulating the distinctively lenis stops in proto-Volta-Bantu, or at least in proto-Volta-Potou, and reinforces the writer's earlier claim (1973a:42-4) that the continued lack of understanding of the articulatory nature of the nonlenis/lenis distinction is a serious obstacle to the progress of the study of the Niger-Congo languages. It also demonstrates the importance of long-range comparison even where, as in the case of the Volta-Comoe languages, there is still a great deal of scope for short-range comparison: the Bia mutation systems appear to incorporate survivals of the non-lenis/lenis distinction even though this distinction seems otherwise to have been completely lost in the Volta-Comoe languages, so that it would not seem that short-range comparison restricted to languages within the Volta-Comoe group could possibly have provided a satisfactory explanation of the Bia situation.

Footnotes

[1] The Grade 1 forms, which are the ones which appear to have undergone the most crucial of the historical changes, are traditionally regarded as the unmutated forms for synchronic purposes. This on the face of it points to a case of 'rule inversion', a phenomenon that in recent years has been extensively debated by Schuh (1972, 1974) and Leben (1974). The question of whether or not the traditional treatment is justifiable, however, is outside the scope of this article.

[2] See footnote 1.

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Proceedings of the Sixth Conference on
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A Reconstructed Chronology of Loss: Swahili Class 9/10

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1. Introduction

Most sound changes that occur in a particular language can usually be accounted for, or described, by a morphophonemic rule and/or diachronic correspondence. Such a formalization achieves a certain level of descriptive adequacy in at least delimiting the distribution and environments of the change, as well as the structural change and structural description. However, many such statements are unsatisfactory and fail to provide a more explanatory statement which reveals the underlying phonetic processes involved, unlike "natural assimilatory" rules whose statements provide direct insight into the assimilatory mechanisms at work, e.g. a rule of nasal-homorganicity. Not all rules are of this sort and not all show the assimilatory basis of the change. Rules which describe loss of segments are often of this sort. Internal reconstruction, furthremore, may not allow a reconstruction of the phonetic process--often assimilatory--involved in cases of segmental loss. The loss of the nasal prefix (hereafter N) in Swahili Class 9/10 nominals is such a case. I wish to discuss this in some detail and show how an examination of closely related languages will often provide more information to the linguist than internal reconstruction to allow a better understanding of the conditions which obtained in a particular instance of segmental loss. The input of dialect studies in these cases is of course not new, but in Bantu studies this is a relatively unexplored field.

2. Synchronic analysis

In a synchronic phonological treatment of the morphophonemics of the noun class system in Swahili a rule would be needed to describe the distribution of the nasal prefix in Class 9/10 nominals. A further rule would also be necessary to handle the distribution of aspiration on initial voiceless stops in the same nominals. Presumably the aspiration associated with these consonants is a reflex of the lost nasal. Thus one possible treatment would order the rule of initial voiceless stop aspiration first, and the rule of nasal deletion second. The rules are listed as (1) and (2) in their order of application:

(1) $C \rightarrow [+\text{aspiration}] \, / \, N \, \_\_$
(2) $N \rightarrow \emptyset \, / \, \_\_ \, [+\text{aspiration}]$

Their application can be demonstrated in the following derivation where a Class 10 nominal undergoes both (1) and (2) in contrast to its Class 11 singular form:

(3)	/u-pepo;	N-pepo/	'wind/cold; high wind/spirits'
	-	p^h	Rule (1)
	-	∅	Rule (2)
	[upepo	p^hepo]	

If, however, the voiceless consonant is the initial of a monosyllabic stem, Rule (2) does not apply; whereas Rule (1) creates the aspirated C, as illustrated in (4):

(4)	/Ń̩-ta/		'wax'
		t^h	Rule (1)
	-		Rule (2) inapplicable
	[ŋ̩́t^ha]		

Rule (2) does not apply in (4) because the nasal is both stressed and syllabic.[1]

Because the nasal prefix is also not realized before voiceless fricatives, as in (5)

(5)	fimbo < /N-fimbo/	'stick'
	siku < /N-siku/	'day'

Rule (2) must be slightly revised to allow deletion of the nasal before voiceless continuants as well as voiceless aspirated stops. This can be achieved simply by use of the feature specification [-voice] as in (6); the rule also must be constrained to prevent deletion of stressed nasal prefixes:

$$(6) \quad N \rightarrow \emptyset \;/\; \underset{[-\text{stress}]}{\underline{\qquad\quad}} \;[-\text{voice}]$$

Derivationally then, the following schema obtains:

(7)	/N-pepo	N-siku	Ń̩-ta	N-bogo/	
	p^h	-	t^h	-	Rule (1) - Aspiration
	∅	∅	-	-	Rule (6) - Deletion
	[p^hepo	siku	ŋ̩́t^ha	mbogo]	
	'spirits	day	wax	buffalo'	

By using a transformational format, as in (8), Rule (1) and (6) can be combined:

$$(8) \quad /N\underset{\bullet}{C}/ \rightarrow \underset{\bullet}{C}^{h}$$

Such a format is actually suggestive of what I will propose underlies the loss of the prefix and aspiration of the voiceless consonant. Rule (8), however, is not fully adequate in handling the loss of the prefix before voiceless fricatives and I will show makes the wrong claims relative to fricatives. Furthermore, formulations such as (1), (6) and (8) are basically statements of the distribution of both nasal-loss and of aspiration. Rule (8) does not have the apparent advantage of indicating some connection between nasal-loss and aspiration that is not shown by the pair of rules (1) and (2) or (1) and (6).

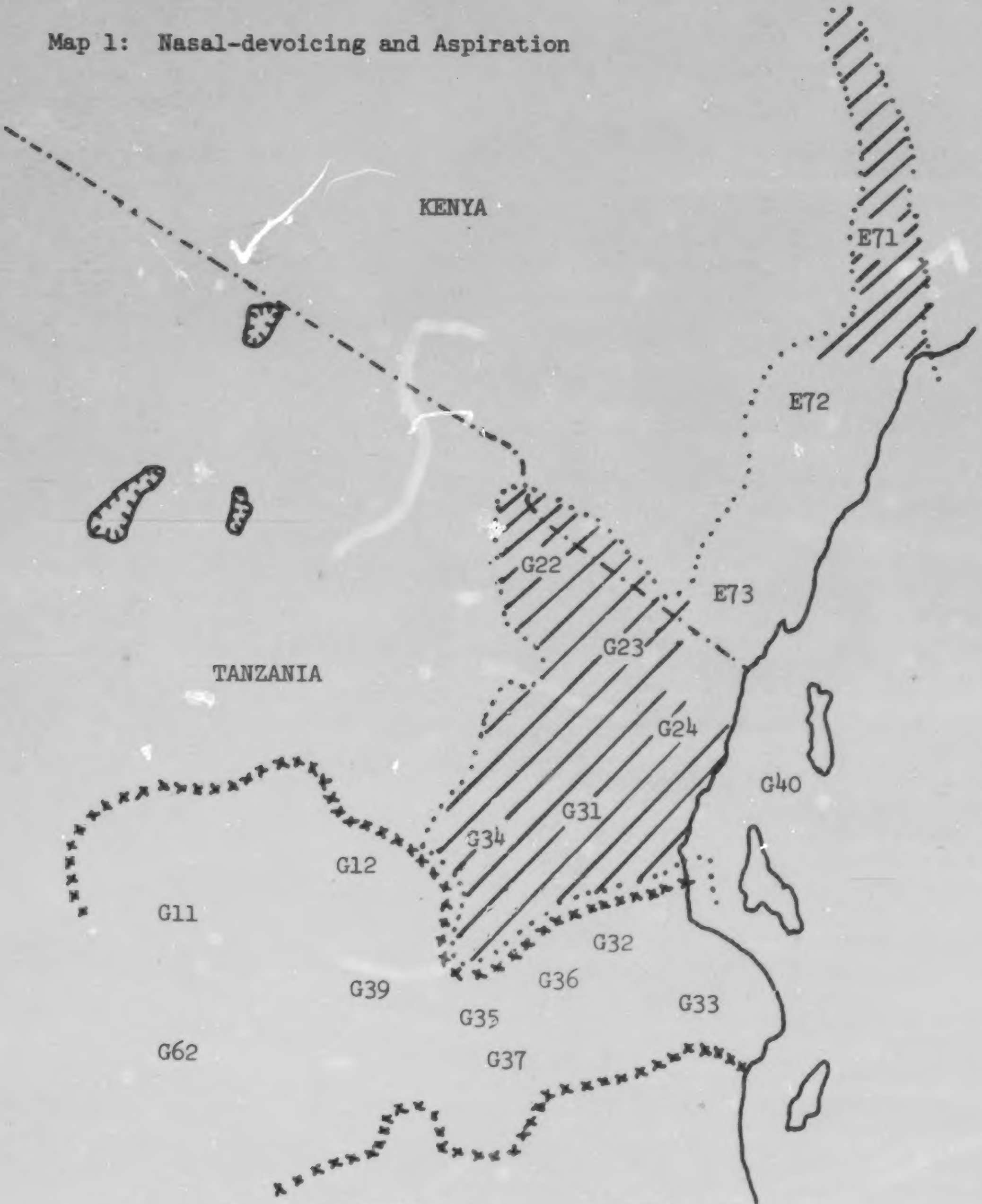
We have several possible descriptions then of the morphophonemic facts of Cl. 9/10. Rule (1) seems unassailable except that it is not totally clear from the form of the rule itself why voiceless stops should aspirate in the environment of a preceding nasal. However, rule (2) and rule (6) are somewhat in conflict in that the conditioning environments are different in each. In (2) the conditioning environment is aspiration; in (6) it is voicing. In one sense aspiration seems to be the appropriate feature except there seems to be no phonetic basis or connection between an aspirated stop and the loss of a nasal before it. It could be claimed that nasality becomes redundant and that aspiration can just as easily function as the morphophonemic mark of Cl. 9/10 nouns and be compatible with the marking function of prefixes in a noun-gender system. Thus the motivation of loss is shifted from a phonetic one to a paradigmatic one. However, this claim does not appear appropriate when fricative-initial stems are considered: they are not morphophonemically marked by aspiration and have no overt phonetic marker of their morphological membership. The feature [-voice] seems to be the preferred feature except the rule itself does not reveal the phonetic motivation behind the loss. Why should voiced segments delete before voiceless stops and voiceless fricatives?

3. Panchronic analysis

An investigation of languages which are closely related to Swahili reveals an interesting and insightful distribution of changes affecting NÇ clusters. Swahili is a Northeast Coastal Bantu language and as such is related to a cohesive set of languages spoken along the Kenyan and Tanzanian coasts.[2] Along the Kenyan coast are the Mijikenda languages (basically Giriama E.72 and Digo E.73 and closely related dialects thereof), and Pokomo (E.71) which is spoken from the coast near Lamu to the northwest along the banks of the Tana River. Pokomo, Mijikenda, and Swahili form a tentative subgroup within NE Coastal Bantu which is called Sabaki following Nurse and Philippson (1974a, b) and Hinnebusch (1974). To the south in Tanzania is located another subgroup of NE Coastal Bantu known as Seuta. Comprising this group are basically Shambala (G.23), Bondei (G.24), Zigula (G.31) and Ngulu (G.34). One other language is also considered in the study: Pare (G.22), a language spoken in the Pare mountains west of Tanga on the Tanzanian coast.

Each of these languages is represented on Map 1. Also included on the map are isoglosses demarcating languages which undergo changes affecting *NÇ clusters. Notice that in the center of this area Swahili (G.40), and the Mijikenda languages and dialects attest the change of *NÇ > Ç^h. This center group, moreover, is interestingly bounded on the north and south by languages which attest the change */NÇ > N̥Ç^h/, that is, the devoicing of the nasal

Map 1: Nasal-devoicing and Aspiration


KENYA
TANZANIA
E71
E72
E73
G22
G23
G24
G40
G31
G34
G12
G11
G32
G36
G39
G35
G33
G62
G37

Legend: .... Nasal-devoicing, aspiration, and/or loss
//// Nasal-devoicing and aspiration only
xxxx *NÇ > N(h)
(isogloss crossing coastline indicates Swahili inclusion)

E71	Pokomo	G31	Zigula	G33	Zaramo
E72	Giryama	G34	Nguru	G35	Luguru
E73	Digo	G40	Swahili	G36	Kami
G22	Pare	G11	Gogo	G37	Kutu
G23	Shambala	G12	Kagulu	G39	Sagara
G24	Bondei	G32	Nhwele	G62	Hehe

prefix through assimilation to the following voiceless stop, and the aspiration of that stop. Examples from Pokomo and Pare are listed in (10) and (11):

(10) Pokomo (Masalani and Lower) (Hinnebusch 1973)

ṃpʰeɸo	'wind'	<	*/N-pepo/
ṇtʰahu	'three'	<	*/N-tatu/
ŋ̣kʰuyu	'big'	<	*/N-ḳudu/

(11) Pare (Nurse and Philippson 1974b)

ṃpʰeho	'wind'	<	*/N-pepo/
ṇtʰondo	'star'	<	*/N-tondo/
ŋ̣kʰombe	'fingernails'	<	*/N-kombe/

Other languages on the periphery of this central area which exhibit the same change are Shambala (G.23), Bondei (G.24), Nguru (G.34), Zigula (G.31), and Doe. These languages are demarcated on the map with diagonal lines, with the whole area bounded by an isogloss which demarcates those languages which attest the change */NÇ̣/ > (Ṇ)Çʰ.

There is further data from Pokomo which also assists in reconstructing the sequence of nasal-loss. In Masalani Pokomo the following Class 9/10 nouns with initial voiceless fricatives occur:

(12) Masalani Pokomo (Hinnebusch 1973)

fulafu	'army ants'	<	/*N-fulafu/
fwisi	'hyena'	<	/*N-fwisi/

Whereas in another Pokomo dialect voiceless nasals are still attested in identical environments:

(13) Lower Pokomo (Hinnebusch 1973)

ṃfunda	'cheek'	<	*/N-funda/
ṃfwisi	'hyena'	<	*/N-fwisi/

A similar distribution was reported for Shambala and Zigula (Tucker and Bryan 1957): voiceless nasals are attested before stops but not before Class 9/10 nouns with voiceless initial fricatives as illustrated in (14):

(14) Shambala and Zigula (Tucker and Bryan 1957)

ṇtʰembo	'elephant'	but	swili	'hair' (Shambala)
ṇtʰembo	'elephant'	but	sigi	'string'
			fili	'hair' (Zigula)

Leaving aside the question of aspiration for the moment, let's first discuss nasal-loss. Given the spatial distribution of nasal-loss languages and nasal-devoicing languages, plus the nature of the changes themselves, it seems eminently straightforward that nasal-loss was first preceded by the sort of devoicing assimilation shown in (10) and (11) and formalized as (15):

(15)

$$[+\text{nasal}] \rightarrow [-\text{voice}] \;/\; \underset{[-\text{stress}]}{\underline{\qquad\quad}} \begin{bmatrix} +\text{cons} \\ -\text{son} \\ -\text{voice} \end{bmatrix}$$

It is only by positing (15) as an intermediate stage does ultimate nasal-loss make any sense thus doing away with part of the oddity of (6) that was noted earlier, namely that it did not reveal the motivation of the loss. Once of course nasal-devoicing occurs the next step is loss, a *fait accompli* for Swahili and Mijikenda, and a prediction for those which still attest a voiceless nasal. Voiceless nasals are somewhat marked segments and furthermore, their most obvious physical manifestation is a noisy egressive air stream through the nasal passage. Since they are already homorganic with the following obstruent, there is little for the hearer, language learner, or language-learning generation to pin down either acoustically or articulatorily. Furthermore, since voiceless nasals are always associated, in the case of stops, with a following aspirated obstruent, their importance either phonetically or morphophonemically (as a Cl. 9/10 nominal marker) is considerably weakened. Loss easily follows.

Given both the Pokomo evidence (10, 12, 13) and data from Shambala and Zigula (14) it is clear that the voiceless nasal disappeared first before voiceless fricatives and then before stops. Acoustically, of course, the stridency of voiceless fricatives easily masks the egressive nasal air stream which is the chief component of voiceless nasals: people do not hear them and thus do not learn them whereas before stops their acoustic effect is stronger and more enduring.

Comparative reconstruction would allow the following schema for Swahili and closely related languages:

(16)	/N-pepo	N-siku/	
	m	n	Nasal-assimilation
	m̥	n	Nasal-devoicing
	-	∅	Nasal-loss (Stage 1)
	∅	-	Nasal-loss (Stage 2)
	[pʰepo	siku]	

(Swahili has undergone Stage 1 and 2 of Nasal-loss, whereas some dialects of Pokomo, Shambala, and Zigula have only undergone Stage 1. Lower Pokomo has, however, not yet undergone either stage.)

Schema (16), as well as the discussion to this point, ignores the source of aspiration. The set of rules discussed earlier (Rules 1 and 2 or 1 and 6) claim that aspiration is independent of nasal-loss. Rule (8) essentially claims that there is some connection between nasal-loss and aspiration and as such comes closest in defining the source of aspiration. I will argue, however, that, in the cases under discussion, aspiration is actually dependent on nasal-devoicing, the stage immediately prior to nasal-loss.

To see this it will help to briefly review the nature of aspiration.

Aspiration has to do with phonation states and is essentially connected with certain configurations of the glottis. We normally think of aspiration as a puff of air and normally associate it with post-consonantal position. It is somewhat more complicated than that. Ladefoged (1971) defines aspiration as "a brief period of voicelessness during and immediately after the release of an articulatory stricture" (p. 8). The puff of air normally associated with aspirated sounds "could either be the result of an extra push from the respiratory muscles, or it could be due to the valvelike action of the glottis, allowing more air to be released" (p. 10). Both plosion and the state of the glottis are intertwined in the production of aspirated sounds.

The following then appears to be what has occurred in Swahili relative to aspiration. Both nasals and voiceless stops involve the formation of strictures of complete closure, and, as well, a pulmonic egressive air-stream. The difference between them is that in the production of the nasal there is no velic closure while stops involve velic closure. Nasals also involve the vibration of the vocal cords whereas in voiceless stops the vocal cords are apart. The stricture of a stop in tandem with the air-stream mechanism creates a certain amount of pressure which upon the release of the stricture results in a degree of plosion. In the case of nasal-consonant clusters (mp, nt, ŋk) the air stream is not dammed up in the production of the nasal but is allowed to pass through the nose. After devoicing of the nasal this air stream is all that remains to attest the presence of a nasal, and is essentially controlled by the closing and opening of the velum. Acoustically the voiceless nasal itself is now only characterized by a noisy expulsion of this air stream through the nasal passages (attested for Pokomo). Now what I propose happens next is somewhat speculative. Either or both of two possibilities may have occurred which can explain the aspiration. Perceptually, native speakers have reinterpreted the period of initial noisiness as post-aspiration rather than pre-aspiration, or a change in timing has occurred in that velic closure occurs before the air pressure has been totally expended in the production of the voiceless nasal and carries over in the release of the stop. Neither has to have occurred independently one of the other. In the case of Pokomo NÇ̣ clusters [Ņ̣Ç̣ʰ] both pre-aspiration and post-aspiration are part of their pronunciation and this would essentially seem to be due to what I have suggested here: air pressure release is spread out over the articulation of both the nasal and stop with the eventual elimination of the period of devoicing in pre-stop position in favor of post-stop position which results in a less marked and more natural distribution. Furthermore, the noisy characteristic of voiceless nasals would seem to involve greater pulmonic pressure than would be called for in the articulation of a plain voiced nasal and this too would result in greater plosion when the following stop stricture is released. Essentially then what has occurred is a metathesis of aspiration, articulatorily and acoustically, with a transfer of a particular phonation state from pre-position to post-position. Thus it seems that nasal-devoicing in these languages is intimately related to aspiration if not actually at the root of it. Consequently the transformation rule given as (8) more accurately reflects what happened phonetically than rules (1) and (2) or (1) and (6).

Rather than rule (8), however, I would propose the following rule (17) which, unlike (8), does not claim that aspiration results immediately in loss, but which does claim that aspiration is concomitant upon nasal-devoicing:

(17) $/N\underset{\bullet}{C}/ \rightarrow \underset{\bullet}{N}\underset{\bullet}{C}^h$

This rule adequately states the situation for Pokomo, Shambala, and others which still attest voiceless nasal-voiceless consonant clusters. A further rule would still be necessary to delete the voiceless nasal in Swahili and Mijikenda; this rule can take either the form of rule (2) or rule (6). In (1) deletion occurs sensitive to the feature [aspiration] and in (6) to the feature [voice]. Deletion or nasal-loss both before stops and fricatives would appear to be due to the acoustic nature of aspirated stops and to the stridency (or sibilancy) of fricatives wherein the voiceless nasal is simply absorbed or masked by a more obvious acoustic parameter. Therefore, a modified form of rule (2) is preferred:

(18)
$$\underset{\bullet}{N} \rightarrow \emptyset \;/\; \underset{[-\text{stress}]}{\underline{\qquad\quad}} \left[\begin{Bmatrix} +\text{aspirated} \\ +\text{sibilance} \end{Bmatrix}\right]$$

This discussion has so far ignored monosyllabic stems in Swahili which are somewhat exceptional as illustrated in (19):

(19)

Swahili	
$\acute{n}t^{h}a$	'wax'
$\acute{\underset{|}{m}}p^{h}ya$	'new'

where a fully voiced nasal is maintained preceding an aspirated stop. These forms appear to be counterexamples to the claim that aspiration in Swahili is essentially due to an assimilatory change of devoicing, I would argue that they are not. First of all, it is clear that the nasal prefix in the examples in (19) does not undergo change because it is both stressed and syllabic. The aspiration, moreover, could then be due to paradigmatic pressures in that all class 9/10 stops are aspirated. Alternatively, by positing a period of partial devoicing the aspiration can be explained as above. This is formalized as (20):

(20) $/N\underset{\bullet}{C}/ \rightarrow N\underset{\bullet}{N}\underset{\bullet}{C}^h$ Stage 1
$\underset{\bullet}{N}\underset{\bullet}{C}^h$ Stage 2

Stage 1 can be posited for all Class 9/10 nominals, but Stage 2, full devoicing, only occurs if the nominal is polysyllabic. The process is illustrated in the schema given in (21):

(21)	/N-pepo	Ń̩-ta/	
	m	n	Nasal-assimilation
	mm̥pʰ	nn̥tʰ	Nasal-devoicing Stage 1
	m̥m̥pʰ	-	Nasal-devoicing Stage 2
	ØØ	Ø	Nasal-deletion
	[pʰepo	ń̩tʰa]	

Stage 1 is completely plausible phonetically and could occur simply as a transition between a fully voiced nasal and a following voiceless segment; its metathesis then to post-consonantal position explains the aspiration. Something similar to this process has been reported for an Indo-Aryan language (John Ohala, personal communication via Leon Jacobson, UCLA).

In conclusion I refer to the schema given as (22) which lists in a discrete fashion the various processes by which nasal-loss has occurred in Swahili.

(22)	/N-pepo	N-siku	Ń̩-ta/	
	m	n	n	Nasal-assimilation
	mm̥pʰ	nn̥sʰ	nn̥tʰ	Nasal-devoicing/aspiration
	m̥	n̥	-	Full devoicing
	-	ØØ	-	Nasal-loss Stage 1
	ØØ	-	Ø	Nasal-loss Stage 2
	-	Ø	-	Aspiration-masking
	[pʰepo	siku	ń̩tʰa]	

(NN̥ = "partial devoicing"; N̥N̥ = "full devoicing")

While this schema and the discussion upon which it is based probably does over-simplify what actually happened in the course of nasal loss in Swahili it does have the advantage of specifying some of the conditions under which Swahili lost its Class 9/10 morphological marker.

Footnotes

[1] Where the nasal prefix is preserved, as in (4) or before stem initial voiced segments, it is always realized as homorganic: ḿ̩pʰya 'new', mbwa 'dog', ŋguruwe 'pig', etc.

[2] For a fuller discussion of the NE Coastal Group see Hinnebusch (1973, 1974).

[3] For a somewhat different schema see Givón (1974).

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.42-43 (1975)

Contributions to the Afroasiatic Comparative Word List

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0. Abstract

The present study is based on sound correspondences described in my papers on Cushitic and Chadic comparative phonology (Sravnitel'no-istoricheskaja fonetika kushitskix jazykov, Moscow, 1973; the articles in "Jazyki Afriki", Moscow, 1966, "Konferencija po sravnitel'no-istoricheskoj grammatike indoevropejskix jazykov", Moscow, 1972, etc.) and in studies by O. Stolbova, N. Panova, and V. Porkhomovsky.

I list here some new (or rectified) Afroasiatic root cognates:

1. Cushitic *ˀVg- 'wait, watch over', Berber *ˀgj 'watch over'
2. Cush. *(ˀVk)kʷVl- 'river, lake', PKotoko *k[u]lV 'lake'
3. Cush.: Bayso ami̲r 'say', Sem. *ˀmr id.
4. Cush. *ˀVn- or *jVn- 'say', Berber *jnj id., Egyptian ʾin id.
5. Cush. *[ˀ]Vr(V)b- 'elephant', PKotoko *Vr(V)pV id., Eg. ˀbw (‹ *ˀVˀbVw ‹ *ˀVrbVw ?) id.
6. Cush. *ˀVS- 'person, man', Sem. *ˀinš- id.
7. Cush. *ˀit(t)- 'eat', Chadic: Fyer ˀet, Tangale ˀed 'eat', cf. IE *ed-, etc. ‹ Nostratian *ˀitä 'eat'
8. ECush. *gʷVʕVr- 'search', Eg. d̲ʕr, Berb. Nefusi ggr, Chad.: PMargi *gVɽ- id., Sura kʸaɣar 'require'
9. Cush. *gʷV[g]- 'road, way', WChad.: PBolewa *go̲g̲o̲ id.
10. ECush.: Somali gudūd 'coriander', Sem.: Hebrew gad̲ id.
11. Cush. *giVl 'time', Sem. *gīl- 'age'
12. CCush. *ĝV(n)ʒ̄- 'wait, be quiet (› 'lie, sleep'), Sem. *gd̲w 'stand firmly'
13. ECush. *ɣVrVj- 'speech', SSem. *ɣrj id., WChad.: Angas ɣirr 'say'
14. Cush. *HUll- 'earth', PBolewa *ˀō̲li id.
15. Cush. *ḥVnKʷVl(l)- 'head, brains', Hausa haŋkali 'mind, inteligence' (?) Sem.: Arabic ʕaḳl- 'mind'
16. Cush. *kʷVll- › Bedauye kal 'water-proof basket', Sem. *klw/j 'pot', Chad. *kʷVlV 'pot'
17. ECush.: Somali kấle 'other', Sem. *klˀ 'both'
18. ECush. *kiVl- 'hernia', Sem. *ḳajl- id., cf. IE *kāulā, *kūlā id.
19. Cush. *ḳʷVł- 'say', Sem. *ḳwl 'say, voice';

20. Cush. *ḳVm- 'devour, eat', Sem.: Arabic ḳmm id.
21. Cush. *ḳ(ʷ)Vpp- (> *ḳVpp̣-, *ḳʷVp̣p̣-, *gʷVp̣-) 'wicker-basket', Sem. *ḳupp- 'basket, container', Eg. ṯb, ḏbʔ 'jail', ḳbj 'pot', WChad.: PBolewa *gabi 'pot', Hausa gufata 'a large basket',
22. ECush. *ḳVrr- 'very cold, ice', Sem. *ḳarḫ- 'ice, cold', Berber *ɣrs 'frozen, hoar-forst' (< Nostr. *ḲirV 'hoar-frost')
23. ECuch. *ḳʷVr- 'a stick', Sem.: Arabic ḳarijjat- id., Hausa ḳirare 'small sticks for firewood'
24. Cush. *ḳVr(r)- 'dark, black', CChad.: PMargi *kʸVrV 'black' (< Nostr. *Ḳarä 'black')
25. Cush. *[ḳ]VrVn- 'horn', Sem. *ḳarn- 'horn', cf. IE *k̂er-(n-) 'horn', etc. (< Nostr. *ḲErV)
26. ECush. *lVb- or *lVp̣- 'lion', Sem. *labʔ- 'lion', (?) PMargi *llvara 'lion', (??) Hausa rabbi 'hunting leopard'
27. Cush. *lVl- 'be sleepy', Sem. *lajl- 'night', NWSem. *ljn 'to pass the night', Eg. nn 'night, darkness', cf. Kartvelian *lul- 'sleep'
28. ECush.: Somali māl- 'to milk', Sem. *mlg 'to suck', Eg. mnḏ 'breast' (< Nostr. *mälgE 'breast')
29. ECush. *mVr- 'turn', Sem. *mwr/*mjr 'turn, change'
30. Cush. *mVr- 'pass', Sem. *mrr 'pass'
31. ECush.: Galla morā 'fat', Chad.: PBolewa *mo̱r, Sura mwȍ̱r, Hausa mâi, PMargi *mal, Kulere mȁr, Bachama mare 'oil', Eg. mrḥ.t 'fat'
32. ECush. *SVkkʷ- 'morning', Berb. *zikk id.
33. WChad.: PBolewa *ʔonn- 'give', Sha ⁿdi id., Sem. *jtn/*ntn 'give' (< *ʔVnt-, cf. Uralic *amtV 'give')
34. PBolewa *ʔin[d]V 'stand firmly', Sem. *ʕmd 'stand'
35. PBolewa *lobw- 'love', Sem. *lwb 'be thirsty', Eg. ʾibj, Coptic libi 'thirst'.

Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.44-55 (1975)

An Acoustic Analysis of Double Articulations in Ibibio

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1. Introduction

This paper presents an acoustic analysis of the double articulated plosives in Ibibio. Ibibio is spoken by between one and two million people in extreme southeastern Nigeria and in part of western Cameroun (Kaufman 1968:1). It is classified by Greenberg (1970:9) as a Cross-River language in the Benue-Congo branch of the Niger-Congo family. The name Ibibio, or Ibibio-Efik, as it is referred to by Greenberg, is applied to a group of dialects which for the most part are mutually intelligible, including Ibibio, Efik, Anang, Eket, Ibeno, and Andoni.

Of these dialects Efik has received the most attention in the literature. Few linguistic treatments of the remaining dialects exist, according to Kaufman. In her dissertation, she lists six vowel phonemes: /i, e, a, ɔ, o, u/. The phonemic consonant system appears in Figure 1.

Figure 1. Consonantal Phonemes (after Kaufman 1968:15).

p	t		k
b	d		
f	s		
m	n	ñ	ŋ
		y	w

In addition she lists two vocalic, three consonantal, and one quantity marker as secondary morphophonemes. The typical syllable canon is CV.

Ibibio is a tone language characterized by the terrace level effect. In this paper I use the grave accent [ˋ] and the acute accent [ˊ] to indicate low and high tones, respectively. If two phonemically high tones occur in the same word, only the first is marked in the phonetic transcription. The second of two acute accents indicates a high tone followed by downstep.

The phonetic realization of the voiceless bilabial plosive phoneme /p/ is of particular interest here. The phoneme /p/ is realized as the double-articulated labial-velar [k͡p] after a pause or juncture according to Kaufman (1968:44-5), e.g. the word ípá 'whip' is phonetically [ík͡pa]. Thus, according to her analysis the double articulation [k͡p] only appears as an allophone of /p/ in a somewhat limited environment; it never appears in final position, for instance.

Determining the acoustic characteristics of the labial-velar presents an interesting problem for the locus theory. According to this theory, place of articulation is detected mainly by transitions of the second formant. The actual locus is at a hypothetical frequency, which serves as the apparent source of the adjacent transitions. Generally, loci for bilabial consonants have been determined to be relatively low in frequency, ca. 700 Hz., while loci for alveolars are intermediate, ca. 1800 Hz., and those of velars are usually the highest, ca. 3000 Hz. (cf. Delattre, et al., 1955:771). However, the precise loci for velars have been rather difficult to determine and are influenced to a great extent by the frequencies associated with adjacent sounds (cf. Green 1969 and references therein).

The research which led to the formation of the locus theory was carried out primarily in English, a language which lacks double articulated plosives. The question is--what is the locus for labial-velar plosives--is it similar to the locus of labials, of velars, or does it have a unique locus? It is the specific purpose of this study to determine the distinctive acoustic characteristics of the labial-velars as opposed to simple labial or velar plosives, and to investigate their properties.

2. Method

The corpus consists of a tape-recording of a randomized list of 35 words read in isolation by a native speaker of Ibibio, a student at Ohio Wesleyan University. The recording was made by means of an Ampex microphone and Ampex 354 tape-recorder using Tenzar 175 tape at 7 1/2 i.p.s. in an Eckel Industries An-eck-oic chamber. The tape was processed using Frøkjær-Jensen Pitch and Intensity meters and displayed by an Elema-Schönander Mingograf. Wide band spectrograms were made on a Voiceprint 700, sections on a Kay Sona-Graph, 6061-A. The acoustic analysis is based on measurements made from the resulting duplex oscillograms, frequency and intensity curves, spectrograms, and sections. Principles of segmentation are based on standard techniques (Naeser 1970, Garnes to appear). All duration measurements are based on the mean of five productions, rounded off to the nearest ms. Frequency measurements are rounded off to the nearest 5 Hz.

3. Results

The results indicate that the double articulated plosives in Ibibio differ from simple plosives in three respects: (1) in phonation and voice onset time, (2) in the frequency of the burst which occurs at release, and (3) in transitions and locus. However, certain similarities also exist--these will be presented as the results are discussed.

3.1. *Phonation and voice onset time*. The double articulation [k͡p] consists of three distinct phases when it occurs in intervocalic position. These phases are (1) an onset, (2) the plosive gap, and (2) a voiced release. Simple plosives on the other hand have only the two expected phases: plosive gap and release. Voiceless plosives are characterized by an absence of energy during the plosive gap followed by a voiceless release, while the voiced plosives are voiced throughout, followed by a very brief voiced release. These relationships are illustrated by the repr-sentative words: [ákp͡a] 'the open sea', [àká] and [àbák] which are both names of towns, cf. Figure 2. Durations appear in Table 1. Representative mingograms of the three plosive types appear in Figure 3 showing the fundamental frequency (Fo), duplex osciologram (DO) and intensity curve (I).

Figure 2. Duration of double articulation [kp͡], voiceless plosive [k] and voiced plosive [b].

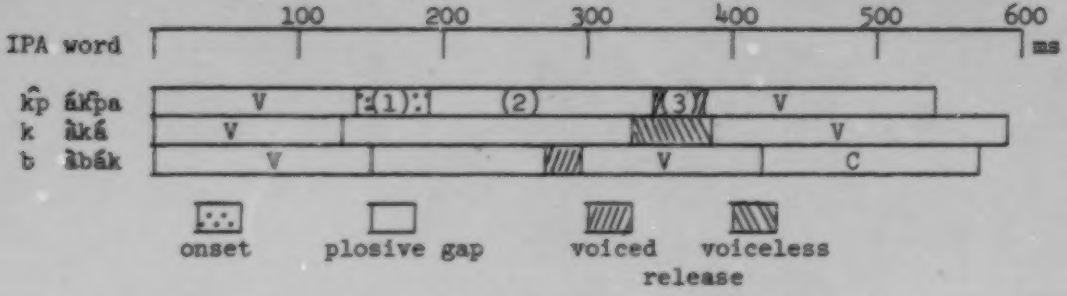
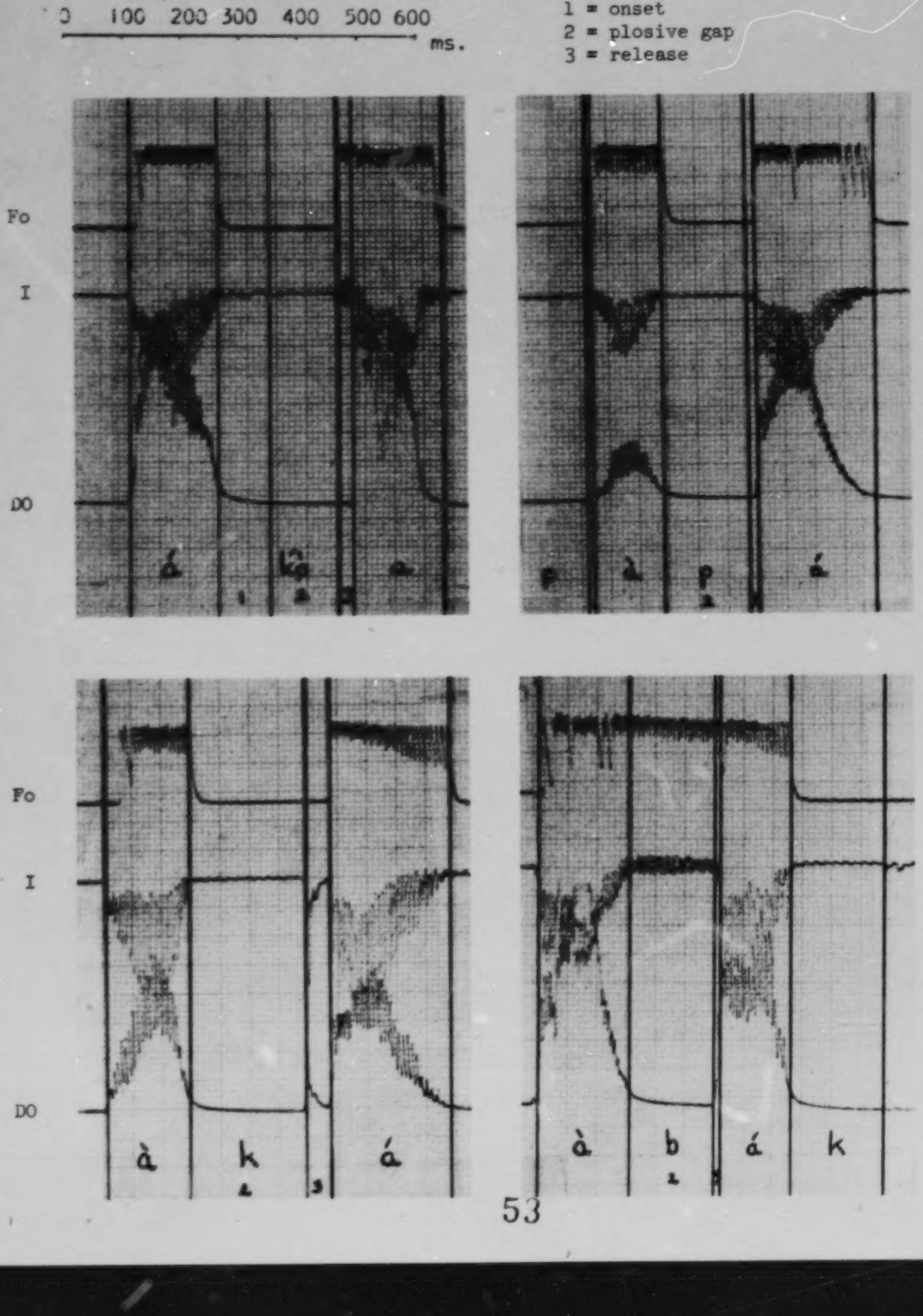


TABLE 1

Durations (ms.) of double articulation [kp͡], voiceless plosive [k] and voiced plosive [b].

word	gloss	vowel	onset	plosive gap	release	vowel	(cons.)	total
ákpa	the open sea	138	57	172	25	158	--	550
àká	name of a town	137	--	220	38	199	--	594
àbák	name of a town	148	--	142	11	130	147	578
ákpa ɔ̄kp͡ɔ ɔ̀kpɔ́	the open sea bone, skeleton male goat		60	179	22			261
àká ɔ̄kɔ́ ɔ̀kɔ̀	name of a town a fence a pot			210	39			249
ábák àbák	palm oil soup name of a town			135	11			146

Figure 3. Fundamental frequency (Fo), intensity (I) and duplex oscillogram (DO) curves illustrating double articulation [k͡p], voiceless plosives [p], [k] and voiced plosive [b].



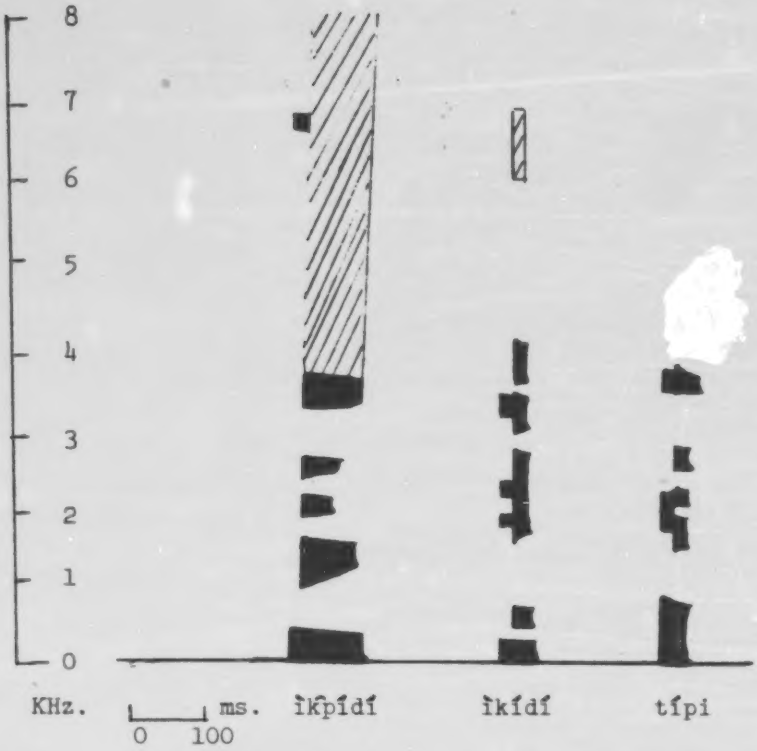
The three phases of the double articulation [k͡p] have distinct properties: (1) the first phase of the double articulation occurs at the cessation of the regular vowel oscillations. It is characterized by irregular, aperiodic low frequency vibrations which may be due to irregular vocal fold flaps.[1] Its mean duration in the three disyllabic words listed in the lower part of Table 1 ([ákpa], [ɔ́kpɔ] 'bone, skeleton', and [ɔ̀kpɔ́], 'male goat') is 60 ms. (2) The second phase consists of the complete absence of energy which is the typical acoustic characteristic of voiceless plosives. In the three disyllabic words, this stage has a mean duration of 179 ms., ca. three times as long as the onset. The mean duration of the corresponding plosive gap in the velar voiceless plosives, as occurs in the words [àká], [ɔ̀kɔ́] 'a fence' and [ɔ̀kɔ̀] 'a pot', is slightly longer--210 ms. On the other hand, the voiced bilabial plosive is considerably shorter; its mean duration in [àbák] and [ábák] 'palm oil soup' is 135 ms. (3) The third stage of the double articulations involves release and voice onset time. The release of the double articulations is complex. Slightly before the actual release of the double articulation and the onset of the post-consonantal vowel, voicing begins--the average duration of voicing plus release is very brief; only 22 ms. On the other hand, the release of the simple voiceless plosive is voiceless; the release of the voiceless velar plosive is 39 ms. in duration.[2] The voiced release of the voiced plosive is very short--11 ms.

Although in phonation and voice onset time the three types of plosives differ, there are similarities. The duration from the end of the first vowel to the onset of the second vowel is nearly identical for the double articulated and voiceless velar plosives. The total vowel to vowel duration is 261 ms. in the words with [k͡p] versus a total of 249 ms. in the words with [k] (see Table 1). This similarity indicates that the two types of plosives are programmed similarly and provides evidence that the double articulation constitutes a single unit of timing.

3.2. Frequency analysis.

3.2.1. Bursts. A frequency analysis of the plosive bursts was obtained by making sections during the final portion of the plosive gap and the release of the double articulations and the voiceless plosives. Schematic diagrams of these sections appear in Figure 4. Distinctly different patterns emerge. In the word [ìk͡pídí] 'if we would come' the release of the labial-velar has an initial concentration of energy at 6500 Hz.immediately followed by concentrations of energy centered at 1200, 2000, 2400, and 3500 Hz. Weak energy is found throughout the frequencies above 3600 Hz. during the release.

Figure 4. Schematic diagrams illustrating frequencies of [K͡p], [k], [p] bursts.



The burst of the velar plosive in [ìkídí] 'as we arrived' has initial concentrations of energy centered at 1900, 2500, and 3500 Hz. In addition the velar plosive has weak concentrations of energy between 6000-7000 Hz., whereas the burst of the intervocalic bilabial plosive in [típi] (English loan word) has energy concentrated at 2000 and 3600 Hz. These measurements obtained here for the simple bilabial and velar voiceless plosives are similar to those found for [p] and [k] before high front vowels in English words as reported by Halle, Hughes and Radley (1956).[3]

In summary, the burst pattern of the double articulation [k͡p] differs in two distinct ways from that of the simple plosives: (1) both of the simple plosives have initial concentrations of energy at lower frequencies, whereas the double articulation lacks these lower frequency concentrations and has a high frequency burst, and (2) neither of the simple plosives has weak energy throughout the higher frequencies following the burst as does [k͡p].

3.2.2. Transitions. The transitions of the three points of articulation--bilabial, velar and labial-velar are distinctive, yet interrelated. Figure 5 gives the mean values of transitions in Hz.

and ms. from steady states of the vowels [e] and [ɔ] to and from the hubs for [b], [k], and [k͡p]. The measurements appear in Table 2; spectrograms of a set of words with [e] appear in Figure 6. For each place of articulation a different pattern obtains. The hubs for [b] are all negative, i.e. lower than the steady state. Thus, for the bilabial and the expected relationship obtains; the measurements indicate that the locus is low.

Figure 5. Transitions of [e]—and [ɔ]--in the environment of [b], [k] and [k͡p].

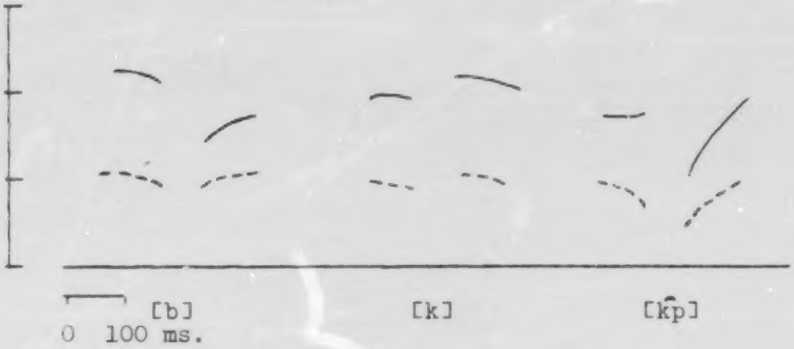
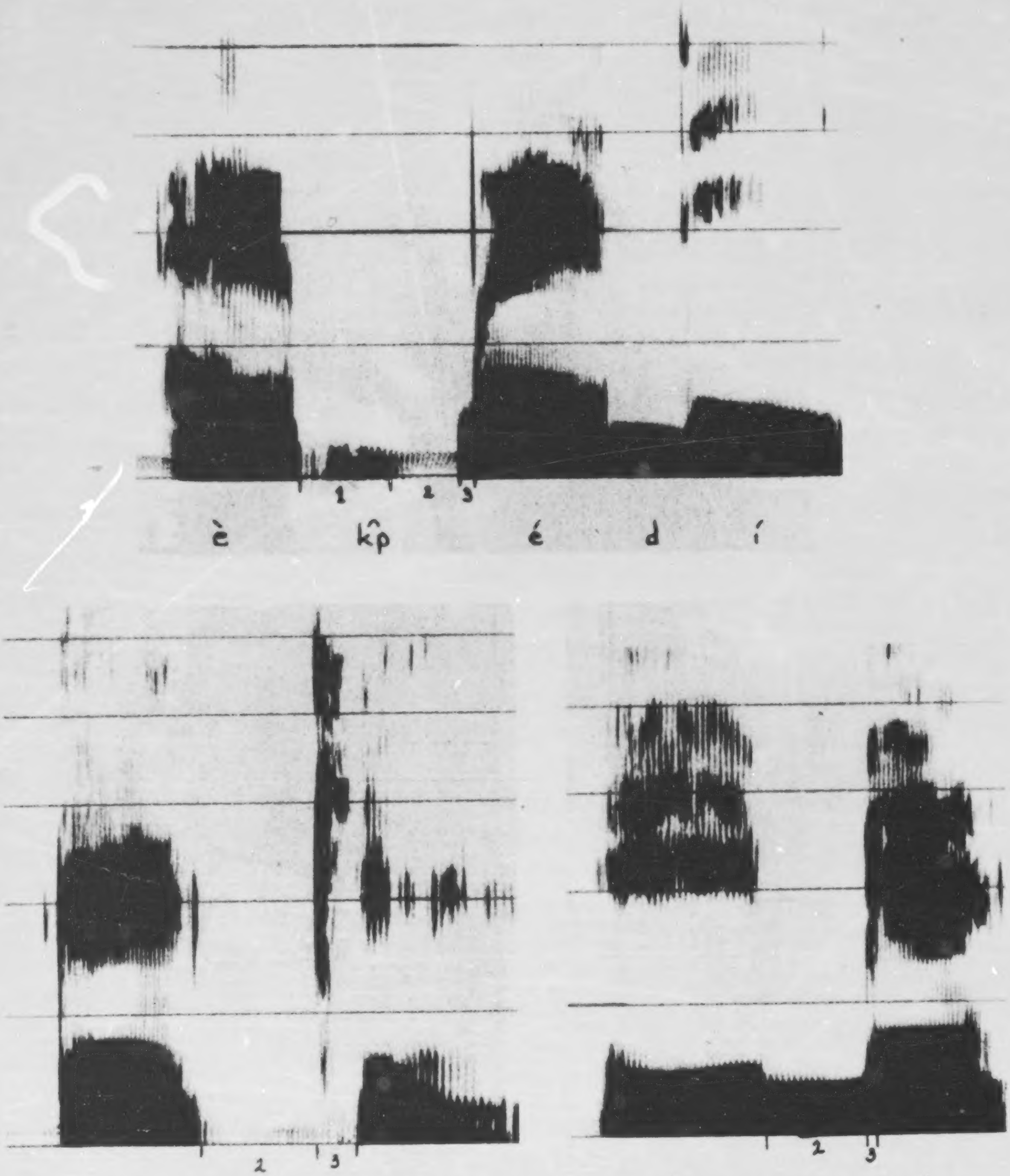


TABLE 2

Frequency and duration measurements of transitions between vocalic steady states (ss) and hubs

	Vowel				Plosive Lexical Item	
	[e]		[ɔ]			
	ss hub	hub ss	ss hub	hub ss		
Hz.	2275-2185	1450-1725	1060-940	915-1070	[b]	èbé 'husband'
Dif.	-90	-275	-120	-155		ɔ́bɔ́ŋ 'chief'
Ms.	46	61	68	65		
Hz.	1975-1950	2190-2065	990-880	1065-980	[k]	ékè 'particle'
Dif.	-25	+125	-110	+85		ɔ̀kɔ́ 'a fence'
Ms.	--	72	49	65		
Hz.	1700-1735	1000-1885	960-980	475-950	[k͡p]	èkpédí 'if they would come'
Dif.	+35	-885	-280	-465		ɔ̀kpɔ́ 'bone, skeleton'
Ms.	--	68	53	56		

Figure 6. Spectrograms illustrating double articulation [k̂p], voiceless plosive [k], voiced plosive [b].



The hubs for [k] do not form as symmetrical a pattern as those for [b]; the preconsonantal vowel transition is negative, whereas the transition for the postconsonantal vowel is positive. (The measurement extends from the onset of voicing to the steady state--no measurement was attempted during the voiceless release.) It is not unexpected that the velar transitions are asymmetrical (cf. Green 1959). However they are clearly different from those of the bilabial.

The transitions in the labial-velar environment also form a unique pattern. The preconsonantal transitions for the unrounded vowel [e] are nearly level and are more similar to those for the simple velar than for the bilabial, whereas the preconsonantal transitions for the rounded vowel [ɔ] are negative and steeper than those for the bilabial. The postconsonantal transition is negative and extremely steep--whereas the difference in the transition from the bilabial hub to the steady state of [e] is 275 Hz, the difference is 885 Hz. following the labial-velar. The transition is similar for rounded vowels also.

It is important to note the duration of the transitions. The transitions following the bilabial and labial-velar occur very rapidly (cf. Table 2). It might seem that with the greater frequency difference between the hub and steady state following the labial-velar, the duration of the transition would be longer. This does not happen, and indeed, if it did, the resulting perceptual effect would be characteristic of a different manner of articulation--a glide--rather than a plosive. The observed rapid transition is essential, and natural for the plosive manner of articulation.[4]

The answer to the primary question of this investigation--can the locus theory account for the labial-velar double articulation is affirmative--the labial-velar is characterized by distinctive transitions. At this point it is interesting to comment on the distribution of the labial-velar and the syllable canon of Ibibio. As mentioned in section 1, the labial-velar is always followed by a vowel. In initial position, where the characteristic onset of the intervocalic labial-velar is absent, the distinctive postconsonantal transition appears, as in [kpʊ̀p] 'make the noise (voiceless bilabial trill)'. If the labial-velar were to occur in final position it is questionable whether sufficient acoustic cues would be present to distinguish it from simple plosives.

4. Discussion

Ladefoged (1968) has investigated the double articulations in considerable detail as they occur in West African languages. He found three sub-types of labial-velars based on the airstream mechanism(s) used in their production. The pulmonic egressive air stream is used "in many Guaŋ languages (Late, Anum)". The other two types use additional air stream mechanism(s). The second type "is found in Yoruba, Ibibio and many other languages" (1968:9). It combines both the pulmonic and the velaric air stream mechanism (the latter is usually associated with clicks). Ladefoged describes it as follows:

> After the two closures have been made, there is a downward movement of the jaw, and a backward movement of the point of contact of the back of the tongue and the soft palate; these movements cause a lowering of the pressure in the mouth. Thus, from the point of view of the release of the closure at the lips, there is an ingressive velaric airstream. But there is still a high pressure behind the velar closure owing to the outgoing air from the lungs (the pulmonic egressive airstream mechanism). Consequently when both closures are released the air flows into the mouth from two directions. This combination of a velaric and pulmonic airstream mechanism has been described very accurately by Siertsema...who concluded that Yoruba [kp] 'is implosive at the lips, "explosive" at the back'. Welmers...also states that in the case of Senadi: 'During the stop, there is noticeable suction in the oral cavity, with a resultant "pop" at the moment of release' (1968:9).

The third type includes the glottalic ingressive airstream (usually associated with implosives) in addition to the velaric and pulmonic air stream mechanisms. Ladefoged posits the presence of this third air stream mechanism based on evidence from oral and pharyngeal air pressure measurements and a microphone trace which indicates a brief period of voicing just before release of the plosive. (No spectrograms of the utterances are included.) It is interesting to note that for the Ibibio informant in this study, a brief period of voicing occurs before release of the labial-velar. It is possible that this voicing is due to a glottalic ingressive air stream in Ibibio, in which case Ibibio is incorrectly placed in the second classification above. However, the period of anticipatory voicing may be due to the release of the velar closure with air from the pulmonic egressive air stream rushing into the oral cavity. Clearly, if the term plosive is primarily associated with the pulmonic air stream, it is not sufficient to account for the double articulations discussed here which also appear to be intimately related to clicks and implosives.

Greenberg (1970) has noticed the connection between double articulations and implosives. He excludes the labial-velars from his study of glottalic consonants, although he presents evidence of a diachronic relationship between labial-velars and bilabial implosives.

5. Conclusion

In conclusion I want to stress that the results discussed here are based on one speaker and need to be submitted to further investigation. However, the analysis of the labial-velar double articulation indicates that it is timed similarly to simple plosives but contrasts with them in four ways: (1) voice onset time, (2) frequency and duration of burst and release, (3) locus, and (4) air stream mechanisms.

Contrastive acoustic analyses of implosives and clicks should prove enlightening in determining the classification of double articulations at the phonetic level. Such studies may provide additional insight into the distribution and historical development of double articulations.

Footnotes

[1] Although Ladefoged presents spectrograms in which low level aperiodic frequencies appear during the plosive gap of voiceless labial-velar double articulations (Itsekiri, plate 2A), he does not discuss that characteristic. The aperiodicity appears to correlate with a drop in oral air pressure, while pharyngeal air pressure is maintained. Ladefoged states that the drop in mouth pressure is due to the lowering of the jaw and the backward movement of the tongue (Ladefoged 1968:9).

Until air pressure measurements are made to determine the source and directionality of air-flow, it appears that for the Ibibio informant in this study, it is possible to hypothesize that the low frequency onset period of the intervocalic labial-velar is produced by air being forced downward by the backward movement of the tongue during the first portion of the closure.

It is important to note that there is no contrast between voiced and voiceless double articulations in Ibibio.

[2] The voiceless plosives have been analyzed (Kaufman 1968:44 ff.) as unaspirated. Her analysis is supported by the measurements found in this study.

[3] Halle, Hughes and Radley (1956:109) found that in productions of the words peel and keel by three speakers the energy density spectra were all strong below 1000 Hz. with those of [p] dropping off rapidly between 3000 and 4000 Hz. while greater energy was maintained for the velar plosive [k] up to 6000 Hz.

[4] Cf. Halle, Hughes and Radley (1956:116) who posit different feature detectors for consonants and vowels based in part on facts similar to those observed here.

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Proceedings of the Sixth Conference on
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Vowel Length in Moore: Its Phonemic Status and Its Orthographic Representation*

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1. Introduction

Decisions to represent given sounds or features in an orthography often depend on assumptions about their phonemic status. In current analyses of Moore, a language of the Gur subfamily of the Niger-Congo (Greenberg 1970:8) and mother tongue of the writer, vowel length seems to present both a theoretical problem--in that its phonemic status has not been convincingly demonstrated--and a practical problem because its representation in the orthography remains unsatisfactory. This paper is an attempt to resolve the theoretical problem and to propose a more satisfactory way of marking length.

2. Phonemic status

It has been correctly observed by all writers on Moore that all the vowels of the language may be short or long. This has led many analysts to the conclusion that vowel length is distinctive, 'phonemic' in Moore. It will be argued here that this distinctiveness is but a surface phenomenon. Rather, it appears that length is predictable everywhere by a general rule, and that without such a rule, other facts of Moore could not be accounted for without a loss of generality or vowel length treated in a uniform way across closely related and mutually intelligible dialects.

The phonemic approach is motivated by such pairs as the following:

(1)	pisi	'twenty'	vs.	(1')	pi:si	'sheep'
(2)	kɪse	'give'		(2')	kɪ:se	'scar'
(3)	bese	'a drink'		(3')	be:se	'dissecate'
(4)	baga	'diviner'		(4')	ba:ga	'dog'
(5)	pusi	'sprout'		(5')	pu:si	'sprinkle'
(6)	buge	'divine'		(6')	bu:ge	'lay on'
(7)	boge	'spirit'		(7')	bo:ge	'decrease'

Many other pairs could be found to contrast long and short nasal or oral vowels. (See Canu 1973:49-58 for abundant examples). However, the conclusion that vowel length 'doit être considérée comme pertinente' must be qualified.

It should be observed, first, that long vowels have a more limited distribution than is often thought. In particular, they do not occur in final position, except in ideophonic formations or in certain verbal forms where a consonant has been deleted, e.g.:

(8) lik tu: 'pitch dark'
(9) yamb fã: 'you all, without exception'
(10) a wa: ka (from: a wa la ka) 'he came here'.

Also, vowel length is automatic, predictable at morpheme boundaries. Compare

(11) baga (=bag+a) 'diviner' vs. ba:ga (ba+ga) 'dog'
(12) tom (tom+m) 'dust' vs. to:m (to+m) 'bitterness'
(13) kɪdga (kɪd+ga) 'shallow' vs. kɪ:ga (kɪ+ga) 'squirrel'
(14) sũmdi (sũm+re) 'pea' vs. sũ:ri (sũ+re) 'heart'

The generalization seems to be that the (last) vowel of a root ending in an open syllable lengthens when a suffix of the form -C(V) is appended to it. Vowel length, then, seems predictable by the rule

(15) $V \rightarrow [+\text{long}] \; / \; \_\_\_ \; +C(V)$

Houis (1960) was the first analyst to make this observation, although the conditioning factor for him was something else. He suggested that such automatic lengthening could be attributed to the effects of stress. Cautiously warning that "l'allongement vocalique est un phénomène dont l'analyse n'est pas encore définitive", he proposed that two functions be assigned to vowel length: a "fonction dinstinctive" when "des voyelles longues s'opposent à des voyelles brèves pour distinguer des sens" and a "fonction de contraste" when "les syllabes radicales sont accentuées par rapport aux syllabes non radicales et cette position sous l'accent est marquée par un allongement de la voyelle" (1960:52).[1] Observe that by attributing length to the effects of stress he was able to describe the phenomenon in purely phonetic terms, whereas the above rule (15) makes use of a morpheme boundary. It is not clear, however, how Houis' solution accounts for the facts observed. For example, length distinguishes meaning in (11) ba:ga 'dog' as opposed to baga 'diviner'. Stress, if pertinent, would fall on the first syllable in both words. There appears to be no particular reason, then, why the /a/ of ba:ga should lengthen under stress and that of baga should remain short under the same conditions. Thus, the distinction between a "fonction distinctive" and a "fonction de contraste" to account for length is not fully explanatory: while stress may very well be necessary, it is not a sufficient condition for lengthening to take place. The crucial environment, as items (11)-(14) show, is the presence of a morpheme boundary and of a -C(V) suffix immediately after the root vowel. A further assumption, viz. that all surface long vowels arise from the application of rule (15) will be substantiated presently.

Peterson (1971) made the first attempt to use a rule such as (15) to account for all surface long vowels in Moore, thus departing from what will henceforth be referred to as 'the long vowel hypothesis' of Canu, Houis and others. But a difficulty immediately arises, since there are surface stems of the form CV̄C+ where the long vowel (V̄) of the stem does not appear in the immediate context ___ +C(V). However, Peterson also observed that all such stems behave exactly like complex stems with respect to tone.[2] He argued that 'if we take into account the tonal patterns of the words, we can show that long vowels are not distinctive at the systematic phonemic level... I have found no CV̄C verbs with a H-H (High-High) tone pattern, nor any verbal nouns derived from such verbs which exhibit a H-H or H-L (High-Low) pattern, which one would expect if these verbs were simplex. From this we can deduce that these words are complex at the systematic phonemic level' (1971:74-75). The proposal is that surface CV̄C+ stems be assigned the structure CV+C. The vowel length rule (15) would thus be general enough to account for all surface long vowels. This assumption allowed him to keep the vowel length rule in its most general form and to provide an insightful analysis of tone. Some other facts are adduced here to lend additional force to his arguments.

First, independently of any analysis of vowel length there is clear morphological evidence that the stem final consonants of complex stems are to be treated as suffixes. Take for example the word *bengre* 'bean', which, by every body's standard, is formed on a complex stem and has the structure *ben-g+re*. It belongs to the re/a noun class and thus has *beanga* (ben-g+a) as its plural. (The presence of the suffix vowel /a/ in be*a*nga is attributable to rule (16) to be presented below). But it also has a second plural *bense* (ben+se), where *se* is the plural suffix in words of the ga/se class. Clearly, the plural form *ben-g+a* is being reanalysed *synchronically* as *ben+ga*; that is, the stem final consonant /g/ is considered as a suffix consonant.

Other examples now involving vowel length are not difficult to come by. Strictly following the 'standard' procedure suggested by Houis and others for isolating stems (cf. fn. 2 above), a word such as *wao:ngo* would be analyzed as *wa:n+go*, where *go* is the class suffix (and the /o/ of wa*o*ngo/ is inserted by a copying rule similar to (16)). The word means 'arrival'. The verb 'to arrive' is *wa*, with a *short* vowel. Clearly, *wao:ngo* is to be analyzed as *wa+n+go* and length accounted for by rule (15).[3] And yet, *wao:ngo* contrasts with *waongo* (wan+go) 'mask', another piece of evidence which indicates that the distinctiveness of vowel length is but a surface phenomenon.

The above examples were adduced to show that the analysis of CV̄C+ stems as CV+C is justified, not only on the basis of tone as Peterson has shown, but also on purely morphological grounds. If this analysis is accepted, rule (15) becomes a very general rule that can account for all surface long vowels. It will now be shown that the long vowel hypothesis makes incorrect predictions about possible segment sequences and leads to quite a complex description of vowel length.

Particularly revealing in this respect is the existence of vowel copying phenomena creating diphthongs in some classes of nominal and adjectival stems, and the way in which such diphthongs are reduced to simple vowels across dialects. Only a subclass of the diphthongization rules will be considered here. (Cf. Nikiema 1974 for a more detailed description). A somewhat simplified version of those rules could be formulated as follows:

$$(16)\quad \emptyset \rightarrow \begin{bmatrix} \text{V} \\ \text{+low} \end{bmatrix} / \begin{bmatrix} \text{V} \\ \text{-high} \\ \text{-low} \end{bmatrix} \_\_\_ \; C_0 + C_0 \begin{bmatrix} \text{V} \\ \text{+low} \end{bmatrix} \#$$

More informally, the low vowel /a/ of the suffix[4] is inserted immediately to the right of a stem vowel if the latter is /e/ or /o/.

E.g. (17) ben-g+a → beanga 'beans'
(18) ben-d+a → beanda 'loin cloth'
(19) sensen+ga → seaseanga 'brochette'
(20) kŏb+a → kŏaba 'bones'
(21) kolnkom+ga → koalnkoanga 'a snap on the head'
(22) tontolntom+ga → toantoalntoanga 'a long line of objects'

The diphthongs created by the copying rule (16) are reduced in the following way in two important dialects of Moore:

Ouagadougou: ea → ɛ; oa → wa
Koupela: ea → ja; oa → wa

In other words, the following rules of glide formation and vowel coalescence must be assumed:

(23) o → w/__a
(24) e → j/__a (Koupela)
(25) ea → ɛ (Ouagadougou).

Given the above copying rule (16), the processes of vowel reduction (23)-(25) and the forms (26) po:lo:m+ga [pwa:lwa:nga], 'a kind of tree', (27) so:m+ba [swa:mba] 'rabbit', (28) pe:l+a [pɛ:la], [pja:la] 'white', nin-ke:m+a [ninkɛ:ma], [ninkja:ma] 'strong, healthy person', the following derivations suggest themselves:

Ougadougou (The asterisk identifies incorrect outputs).

		po:lo:m+ga	so:m+ba	pe:l+a	nin-ke:m+a
a.	(16)	po:alo:am+ga	so:am+ba	pe:al+a	nin-ke:am+a
b.	(23)	pw:alw:am+ga	sw:am+ba	----	----
c.	(25)	----	----	pɛ:l+a	nin-kɛ:m+a
d.	Other	*pw:alw:anga	*sw:amba	pɛ:la	niŋkɛ:ma
e.		*pwalwanga	*swamba		

Koupela

		po:lo:m+ga	so:m+ba	pe:l+a	nin-ke:m+a
a.	(16)	po:alo:am+ga	so:am+ba	pe:al+a	nin-ke:am+a
b.	(23)	pw:alw:am+ga	sw:am+ba	----	----
c.	(24)	----	----	pj:al+a	nin-kj:am+a
d.	Other	*pw:alw:anga	*sw:amba	*pj:ala	*ninkj:ama
e.		*pwalwanga	*swamba	*pjala	*niŋkjama

The long vowel hypothesis predicts that V:V sequences (long vowels followed by a (short) vowel) are possible sequences in Moore. (Cf. line (a) in the derivations). However, such sequences do not occur.[5] To be able to account for the impossibility of V:V sequences and still maintain the long vowel hypothesis it would be necessary to incorporate a rule of the form (15'):

(15') V:V → VV:

In this case, however, at least three rules will be needed to account for surface long vowels: rule (15), rule (15') and another rule in cases where lengthening could be attributed to the deletion of a consonant. The length in wao:ngo (from wa-n+go) would still not be accounted for.

In the course of the same derivations presented above, Glide Formation applies (rules 23 and 24). Whether it is assumed that long vowels also become long glides (line d in the derivations) or, as is more likely, at least in this environment, short glides by some general convention (line 3), the independently motivated rules still yield the wrong results in both dialects, except where Vowel Coalescence (rule 25) applies instead of Glide Formation. Thus, not only does the long vowel hypothesis lack in explanatory power, it also makes incorrect empirical predictions.

Such wrong predictions are not possible in Peterson's analysis. If it is assumed that all apparent CVC stems are in fact complex stems (as their tonal pattern and their morphological shape indicate) and that all surface long vowels are short in their underlying representation, all the observed facts can be accurately accounted for in a very straightforward way. The derivations of (30): no-ga [nwa:ga], 'hen', (31) se-ga [sɛ:ga], [sja:ga] 'back' and of items (26)-(29) would be:

Ouagadougou

	po-lo-m-ga	so-m-ba	no-ga	pe-l-a	nin-ke-m-a	se-ga
(16)	poa-loa-m-ga	soa-m-ba	noa-ga	pea-l-a	nin-kea-m-a	sea-ga
(23)	pwa-lwa-m-ga	swa-m-ba	nwa-ga	----	----	----
(25)	----	----	----	pɛ-l-a	nin-kɛ-m-a	sɛ-ga
(15)	pwa:-lwa:-m-ga	swa:-m-ba	nwa:-ga	pɛ:-l-a	nin-kɛ:-m-a	sɛ:-ga
Other	pwa:lwa:ŋga	swa:mba	nwa:ga	pɛ:la	niŋkɛ:ma	sɛ:ga

Koupela

	po-lo-m-ga	so-m-ba	no-ga	pe-l-a	nin-ke-m-a	se-ga
(16)	poa-loa-m-ga	soa-m-ba	noa-ga	pea-l-a	nin-kea-m-a	sea-ga
(23)	pwa-lwa-m-ga	swa-m-ba	nwa-ga	----	----	----
(24)	----	----	----	pja-l-a	nin-kja-m-a	sja-ga
(15)	pwa:-lwa:m-ga	swa:-m-ba	nwa:-ga	pja:-l-a	nin-kja-m-a	sja:-ga
Other	pwa:lwa:ŋga	swa:mba	nwa:ga	pja:la	niŋkja:ma	sja:ga[6]

It seems, then, that Peterson's conclusion is correct, and it is claimed here that all vowels are short in Moore and vowel length predictable by general rule.[7] The problem of how length should be represented in the orthography is taken up next.

3. Orthographic representation

At the beginning of this paper, it was mentioned that decisions to represent a sound in the orthography often depend on assumptions about its phonemic status. In fact, the orthography maker is faced with at least two competing theories. On the one hand, the Summer Institute of Linguistics theory championed by Pike and many specialists working in the structural school of linguistics, advocates a strict phonemic principle, i.e., that all and only the phonemes of a language should be represented in the orthography and 'there should be a one to one correspondence between each phoneme and the symbolization of that phoneme' (Pike 1947:208). This view is either explicitly stated or implicitly assumed in the works of language planners and linguists such as Canu (1967, 1969), Colliet (1965:xiii), Houis (1960:52), Ray (1963:27ff, Ch. 8 et passim, although he does not commit himself too much), Swadesh (1934:35), Tauli (1968:Ch. VI), International African Institute (1962:17), etc. (Notorious dissidents are Haugen (1966:54 et passim) and Joos (1960)). On the other hand, the opposite view has been taken by Chomsky (1970), Chomsky and Halle (1968:49ff) who emphasize the merits of abstract 'conventional spelling', claiming that 'reading will be facilitated to the extent that the orthography...corresponds to the underlying representation provided by the grammar' (50). In other words, the orthography should be emptied of all that is predictable by general rule.

The assumption in both theories seems to be that orthographic representation and phonemic or systematic phonemic representations should be alike as much as possible. Obviously, orthographic representation and phonemic or systematic phonemic representations in formal grammars may have to meet some of the same requirements. Thus an orthography must reflect the structure of the language it is used to represent. Also, it would seem that biuniqueness must be respected as much as possible in an orthography. However, an orthography also has different functions from the linguistic functions just mentioned. Thus, it is a tool in the hands of non-homogeneous language communities and must be usable by as many people as possible. In this sense, constraining the orthography to be strictly phonemic and thus failing to accommodate dialectal variation ascertainable at the phonemic level (as recommended in Tauli 1968:129) would seriously jeopardize its usefulness. To be able to integrate dialectal variation as much as possible, then, some degree of abstractness must be allowed. The best orthography is the one that best reflects the structure of the language it is used to represent and is usable by the largest possible number of speakers. Also, because of its social function, an orthography may be constrained by many practical and extra linguistic considerations: it must meet certain aesthetic requirements, it must be easy to use both in reading and writing, so that it may become appropriate at times to represent sounds or features that are either predictable by general rule or not directly phonemic in the language. The choice of a sound for representation in the orthography may also depend on the availability of symbols on a standard typewriter. (Smalley, 1964a, presents many of the practical problems that may arise in the elaboration of an orthography).

The case of vowel length in Moore may serve as a good illustration of those points. In the face of all the facts exposed above, it seems that three alternatives offer themselves. (1) since length is predictable by general rule it should not be represented in the orthography. It should be observed, in effect, that the analysis of vowel length proposed above is at least defensible within the standard theory of phonology outlined in Chomsky and Halle (1968). If their abstract theory of orthography is followed and this first alternative chosen, then, words would be represented in the orthography in the form they would have in their abstract systematic phonemic representation. In particular, items such as (11) *ba:ga*, *baga*, (26) *poa:loa:nga*, (28) *pea:la* should, accordingly, be written *baga*, *baga*, *polonga*, *pela* respectively. (Vowel copy being a general rule, the epenthetic vowel would not appear in (26) and (28)). This alternative offers quite an economical coding system. It is clear, however, that not marking length in the orthography would lead to many confusions (although this remains to be seriously tested on naive native speakers). For example, the sentence '*baga zoeta satãse*' would mean either 'the dog dreads thunder' or 'the deviner dreads thunder'; the word for 'white' and that for 'pelvis' would be spelled alike, i.e. *pela*, etc. Biuniqueness will also be violated in many cases in this approach (for example in those words where the epenthetic vowel is omitted), thus widening the gap between the written and the spoken forms. It thus seems that the 'abstract' solution is not recommendable.

To avoid confusions, the practice presently followed in the orthography of Moore is along the lines of the second alternative: (2) vowel length should be marked only in some environments. The important question is: in what environments? UNESCO (1968) proposed the following guidelines: "Dans l'écriture on ne marque la longueur que lorsqu'elle est indispensable, c'est-à-dire, (a) lorsque l'allongement a une fonction grammaticale: *a lui taore* 'qu'il passe devant', *a luii taore* 'il a passé devant'. (b) lorsque l'absence d'allongement entraînerait une confusion ou rendrait difficile la compréhension d'un mot: *moagga* 'originaire du moogo', *moaga* 'humide', *noaaga* 'gallinacé', *noaga* : pas de sens" (1968:9).

It seems clear, however, that such principles are rather vaguely formulated and hard to apply with any consistency. Take principle (a), for example. It seems rather unlikely that the man in the street will identify with the great precision required the so-called "fonction grammaticale" of vowel length. Principle (b) is even less recommendable. For one thing, no speaker of any language can be expected to know all the words of his language. Confusion may, thus, arise in many unpredictable ways. Even granting that all the words are known, the reader may very well find ambiguous and thus confusing, a word or even a whole sentence where the writer had seen but one meaning, and it cannot be required of writers that they compute all cases of ambiguity before deciding whether to mark length or not. In fact, if this principle is taken literally, there is no guarantee that the same word will be spelled the same way by two different speakers or even by the same speaker in different contexts. This principle, then, cannot be applied rigorously by anybody. (See Smalley 1964:41 for similar criticisms).

As an illustration of the arbitrariness to which those principles may lead, take the word taore 'front' where the diphthong, whether rendered as [aw:] or [ɔ:] is long. Principle (a), if it is correctly interpreted, is inapplicable since taore is not a verb. Applying principle (b) one may write taore, because there is not, in contrast, a word taore with a short diphthong. But the very same situation arises in the case of noaaga 'hen'. This word could be spelled noaga and no confusion would arise, there being no word noaga with a short vowel. (noag a 'take it' is written in two words and the tonal pattern is quite different). In short, the decision to write taore instead of taoore, noaaga instead of noaga, as advised by UNESCO, is utterly arbitrary.

It thus seems impossible or, rather, difficult and impractical to try to isolate those cases where length should be marked and those where it could be dispensed with. The 'phonemic' approach advocated by UNESCO has, thus, also failed in coping with the situation. To avoid all arbitrariness and allow an unambiguous marking of length by all speakers, then, the third alternative becomes imperative: (3) vowel length should be noted in all instances of its occurrence.

But a practical difficulty immediately arises. It was suggested in Burssens (1969:24) and International African Institute (1962: 13) that 'long sounds be represented by doubling the letter'. This leads to an accumulation of vowels in the representation of long diphthongs.

E.G. (32) waongo 'mask' vs. (32') waoongo 'arrival'
(33) beaaga 'mean' vs. (33') boeaaga 'he-goat'

The graphic shape of (33') clearly lacks in aesthetics and would impair reading considerably. However, to be able to capture dialectal variation as much as possible and allow most speakers to read in their own dialects, it was suggested in Houis (1960) and Nikiema (ms.) that the diphthongs rather than the result of their contraction be represented in the orthography. Another means of marking length should, thus, be sought. It is proposed here that /h/ be used for that purpose[8] under the following conditions: /h/ marks length (a) immediately after a vowel and before a consonant, (b) immediately after a vowel in word final position. /h/ is a regular (fricative) consonant in all other contexts, i.e., word initially, in intervocalic position or immediately after a consonant. For the sake of clarity this convention is formalized as (34) below:

(34)

$$h \rightarrow \left\{ \begin{array}{l} [:] \;/\; V\_\_ \left\{ \begin{smallmatrix} C \\ \# \end{smallmatrix} \right\} \\ h \;/\; \left\{ \begin{array}{l} \left\{ \begin{smallmatrix} C \\ \# \end{smallmatrix} \right\} \_\_ \\ V \_\_ V \end{array} \right\} \end{array} \right\}$$

([:] stands for length, C for any consonant, V for any vowel and # for word boundary. The curly brackets express the notion 'either or'.)

In other words, /h/ when marking length just spells out the morpheme boundary that appears in the vowel length rule (15).

This convention takes advantage of the fact that long vowels are in some kind of complementary distribution with /h/. As was observed above, long vowels are not followed by another vowel, so that in intervocalic position, /h/ cannot represent length. Also, /h/ does not occur word finally (except in some cases as an allophone of /s/, which does not pose a problem for the orthography since only /s/ will be represented in those environments in the orthography). Finally, it turns out that /h/ as a distinctive (fricative) sound occurs only in words borrowed from Arabic (cf. Canu's 1968 study on loan words) and even there its distribution is limited to the contexts specified in rule (34).

The adoption of this convention would help circumvent all the difficulties mentioned above: vowel length would be unambiguously marked in all instances of its occurrence, thus making unnecessary the arbitrary decisions criticized above. The problem of piling up vowels as in boeaaga would no longer arise, as the new system allows a maximum of three vowels in a row (and three vowel sequences are permitted in the present orthography). Finally, dialectal variation may now be accommodated in the orthography and all words containing a long vowel assigned one and the same graphic representation for speakers of various dialects. Below is a sample list of words to illustrate how the convention may be applied.

	Phonetic shape	Orthographic representation
(26)	pwa:lwa:nga	poahloahnga
(27)	swa:mba	soahmba
(28)	pɛ:la, pja:la	peahla
(29)	niŋkɛ:ma, niŋkja:ma	ninkeahma
(32')	wɔ:ŋgo, waw:ngo	waohngo
(33)	bɛ:ga, bja:ga	beahga
(33')	bwɛ:ga	boeahga
(35)	halha:le	halhahle
(36)	lohorəm	lohorem
(37)	hahaha:	hahahah
(38)	nwa:ga	noahga
(39)	tɔ:re, taw:re	taohre

Footnotes

*I have greatly benefited from the patience and the encouragements of Professor Charles Bird who has read the first draft of this paper and offered many constructive criticisms as well as suggestions for improvement. I am also grateful to P. Kokora for his comments and to H. Songre for helping with some of the data from the Koupela dialect. However, I alone should be held responsible for all remaining errors and unclarities.

[1] Canu (1973) did not take notice of these facts pointed out by Houis and relied solely on the results of the commutation test as well as some acoustic data that he adduces to support his points. It is interesting in this respect to notice that in his excellent analysis of Kasim (a language very closely related to Moore), E. Bonvini (1974) working within the same theoretical framework as Canu and Houis chose to ignore the results of the commutation test and to conclude (persuasively) that vowel length is not phonemic in Kasim (cf. Bonvini 1974:65). It is apparent, then, that the comparison of minimal pairs alone is not sufficient to establish phonemic status.

[2] The standard analytical procedure followed in isolating stems in nouns and adjectives (reference to verbs will be limited in this paper) is to analyse noun-noun and noun-adjective compounds (cf. Bunkungu 1971:5 and Houis 1972:16). In such compounds only the last member retains its class suffix and the other members appear in their 'integral' root form. However, the procedure is not fully reliable and recourse is often had to other means. For example, the noun *yõbgre* 'shrinking' belongs to the re/a class and its stem would be *yõbg+*. However, the verbal stem from which it is derived is *yõb+*. Consequently, *yõbgre* is analysed as *yõb-g+re*. On the basis of similar analyses a distinction is made between *complex* and *simple stems*. Simple stems are of the form $CV(C)^+$ (e.g. the verbal stem *yõb-* or the stem of *wãka* 'hoe': *wãg+ga*). The majority of nouns formed on a simple stem have the tone pattern High-Low, Low-High (cf. Peterson 1971:49-50). Complex stems are of the form $(CV(C)-C_1^+$; (e.g. *yõb-g+*; *sab-l+go* 'black'; *tɪb-s-d+ba* 'curers', etc.) and only words derived from them may exhibit a 'non-automatic down-step' tone (i.e. a mid tone, roughly speaking) or different tone patterns in their singular and their plural forms (Peterson 1971: 56).

[3] Interestingly enough, the last consonant in so-called CV̄C stems is either a nasal or *l*,*s*,*d* or *g*, i.e. the very *same* set of consonants found in complex stems. It often figures there for purely euphonic purposes and so does not have or add any meaning. Both Bunkungu (1971) and Houis (1972) agree on this fact: Bunkungu writes: 'il est possible, dans certains cas, que cette consonne soit seulement une consonne de soutien' (12); and Houis (1972:19): 'il semblerait en effet dans certains cas que la consonne figure plus pour des raisons d'euphonie, comme consonne de soutien (épenthèse), que comme dérivatif proprement dit ajoutant une nuance sémantique'.

[4] In Moore the only low vowel with phonemic status is /a/. Rule (16) also applies in verbs under more restricted circumstances.

[5] Such spellings as *kâaongo* 'Guinea fowl', *paaongo* 'gain' *gaaongo* 'mixing', etc. in Bunkungu (1972:41) for words that have undergone a copying rule comparable to (16) reflect more of an attempt to preserve the alleged long vowel phonemes of the root in the orthography rather than actual pronunciation.

[6] In the derivations proposed earlier, the words *pe:l+a* and *nin-ke:m+a* have been analysed as they would be if the procedure mentioned above (cf. fn. 2) is followed and the long vowel hypothesis maintained: [pɛ:la] 'white' contrasts with [pɛla] 'pelvis', and [kɛ:ma] with [kɛma] 'a musical instrument'. However, there are reasons to believe that they in fact come from *pel-l+a*, (nin)-*keg-m+a* respectively, and that the root final consonant was lost. In effect, the verb 'to whiten' is *pel+ge* with a short vowel, and the verb from which *ke:m+a* is derivable is *keg+m+e*. Root final consonant deletion feeds rule (15) in Peterson's analysis, so that there is no need to advocate a different principle, say, compensatory lengthening, to account for length in any of these words. Also, the choice of *poa:loa:nga* is not particularly felicitous: a comparison with what is said in other dialects suggests that it is primarily an idiophone formed by some kind of reduplication, so that the sliced parts do not have any specific meaning. It is very probably the problem of meaning that caused Houis' reluctance to hypothesize that length is predictable everywhere in Moore. The assumption seems to be that if the stem final consonant of CV̆C stems is isolated as a suffix, the remaining CV- may not always have a meaning. From the observations in fn. 3, however, it is clear that this consonant often contributes nothing to the meaning of the stem, since it itself is meaningless in most cases.

[7] The problem of how idiophones should be treated is left open.

[8] Smalley (1964c) reports that 'there was considerable discussion' as to how vowel length should be marked in the orthography of Moore 'some of the group (supported by Houis) wanting to write Vh'. (124). Unfortunately, he does not give the reasons why the proposal was finally dismissed.

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Nasal Interactions and Bantu Vowel-Initial Roots; The Morphological or Phonological Solution?*

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1. Introduction

In many Bantu languages, synchronic vowel-initial roots (henceforth V-initial roots) have been created by the operation of an historical rule which deleted a consonant in root-initial position. However, it is often the case that the reflex of that historical consonant continues to surface when a nasal prefix precedes the root. This is schematicized in (1):

(1) $^*C \rightarrow \emptyset$ / V $\underline{+}$ V while *N-CV → NCV

As a result, the following synchronic surface alternations may exist for V-initial roots: NCV_1 / $-V_1$. These alternations pose an interesting problem of analysis: are they best described in terms of a morphological-type spelling rule (in which /N + V/ is spelled as surface NCV), or are they best described in terms of a more abstract phonological analysis? The phonological analysis would insert a consonant (at some stage in the derivation) between the nasal prefix and the initial vowel of the root, and allow the nasal interaction rules of the language to derive the correct surface forms. The phonological solution may be abstract in the sense that the inserted consonant may or may not actually surface, due to the application of subsequent rules affecting nasals or nasal-consonant clusters, which neutralize or alter the inserted consonant.

Although this problem is a quite general one in Bantu, the discussion will be restricted to the OluTsootso dialect of (Olu) Luhya, a Bantu language spoken in Kenya.[1] There is compelling evidence in favor of the abstract phonological solution as the correct description of nasal interactions with V-initial roots in that language.

2. V-Initial Roots and Nasal Interactions

We can begin by examining the alternations of V-initial roots. Listed in (2) are some V-initial nouns and adjectives in non-nasal and nasal contexts:

(2)	/olu-ika/ →	olwiika 'horn'	/tsiN-ika/ →	tsiinzika 'horns'
	/olu-imbo/ →	olwiimbo 'song'	/tsiN-imbo/ →	tsiiñimbo 'songs'

/omu-uchi/ →	omuuchi 'sharp (cl. 3)'	/iN-uchi/ →	inzuchi 'sharp (cl. 9)'
/ama-angu/ →	amaangu 'light (cl. 6)'	/tsiN-angu/ →	tsiiñangu 'light (cl. 10)'

Some verbal V-initial roots are listed in (3) in nasal contexts:

(3)	/aβul/	/eN-aβul-a-ng-a/ → enzaβulaanga	I split
		/N-aβul-á/ → nzaβulá	Split me
	/iβ/	/eN-iβ-a-ng-a/ → enziβaanga	I steal
		/N-iβá/ → nziβá	Steal me
	/eng/	/eN-eng-a-ng-a/ → eñengaanga	I ripen
		/N-eng-il-á/ → ñenjelá	Ripen for me
	/um-i/	/eN-um-i-ng-i-a/ → eñumiinjia	I dry
		/N-um-i-á/ → ñumíá	Dry me

The examples in (2) and (3) show that V-initial roots surface as nzV or ñV when preceded by a nasal underlyingly.

3. Y-Initial Roots and Nasal Interactions

Before we attempt to formulate the above interactions, let us consider some y-initial noun and adjective roots:

(4)	/axa-yofu/ →	axayofu 'elephant (dim.)'	/iN-yofu/ →	inzofu 'elephant'
	/axa-yuundo/→	axayuundo 'hammer (dim.)'	/iN-yuundo/→	iñuundo 'hammer'
	/omu-yiinda/→	omuyiinda 'rich (cl. 1)'	/iN-yiinda/→	iñiinda 'rich (cl. 9)'
	/omu-yu/ →	omuyu 'warm (cl. 3)'	/tsiN-yu/ →	tsiinzu 'warm (cl. 10)'

Verbal y-root initial roots in nasal contexts are listed below:

(5)	/yaβil/	/eN-yaβil-a-ng-a/ → enzaβilaanga	I bury
		/N-yaβil-á/ → nzaβilá	Bury me
	/yoomb/	/eN-yoomb-a-ng-a/ → eñoombaanga	I surpass
		/N-yoomb-á/ ñoombá	Suprass me

/yeel/	/eN-yeel-a-ng-a/ → enzeelaanga	I land
	/N-yeel-il-á/ → nzeelelá	Land for me
/yeeng/	/eN-yeeng-a-mg-a/ → eñeengaanga	I ferment
	/N-yeeng-il-á/ → ñeenjelá	Brew for me

As the data above show, a rule taking *y* to *z* when a nasal precedes is indicated. A similar rule exists in certain Latin American Spanish varieties, and is not unmotivated phonetically.[2] The appearance of *ñ* is apparently due to the application of the synchronic reflex of the Ganda Law, a nasal cluster simplification rule.[3] This rule seems to apply in OluTsootso to *l* and *y*, when these are preceded by a nasal prefix and followed by a nasal or nasal cluster in the following syllable. The nasal prefix assimilates to the point of articulation of the *l* or *y*, and surfaces as alveolar *n* or palatal *ñ*; the *l* or *y* is deleted. Thus, the interactions of nasals with *y*-initial roots can be described in terms of phonetically plausible and well-motivated rule-governed phenomena.

4. Arguments and Analysis of Nasal Interactions

We can now turn to the question of formulating the nasal interactions of V-initial roots. In terms of the descriptive devices mentioned in the introduction, we could propose that the underlying /N + V/ sequence be spelled as surface *nzV* or *ñV* (the morphological spelling solution). The alternative abstract phonological analysis would be to insert a *y* between the nasal and the initial V of the root, and allow the nasal interaction rules of section 3 to derive the surface *nzV* or *ñV*. The following are arguments in favor of the abstract phonological solution in OluTsootso.

4.1. Prima facie evidence is in favor of the abstract phonological solution, since nasals condition identical surface alternations in a fair range of morphological contexts for both *y*-initial and V-initial roots. A grammar with a rule of *y*-insertion captures the similarity in distribution of *nz* and *ñ*.

Under the spelling-rule analysis, the derivation of surface *ñ V* is somewhat problematical. Specifying that *ñ* appears when a nasal is in the following syllable obviously duplicates the effect of the synchronic Ganda Law, which is already independently motivated for the *y*-initial roots. In addition, there are rare and apparently idiosyncratic instances in which *ñ* or *nz* surface when *n* is the nasal in the following syllable. This is illustrated in (6), where the verb roots /an/ and /in/ surface with either *nz* or *ñ* when a nasal precedes:

(6)	/an/	/eN-an-a-ng-a/ →	e-ñ-ananga nz	'I "moo"'
	/in/	/N-in-i-á/ →	ñ iníá nz	'Dip me'

Other V-initial verb roots of the form /-Vn.../ do not show such fluctuation, but surface with *ñ*, and not *nz*:

(7) /anix/ /eN-anix-a-ng-a/ → eñanixaanga 'I put out'
/onoon-i/ /N-onoon-i-á/ → ñonooníá 'Spoil me'

Now, notice that a similar discrepancy exists for *y*-initial roots in (8), where a verbal form /yiin-i/ shows fluctuation, whereas the noun root surfaces with *ñ* only:

(8) /yiin-i/ /eN-yiin-i-ng-i-a/ → e- ñ -iiniinjia
nz
'I remove'
/yani/ /iN-yani/ → iñani 'baboon'

The point is that the spelling analysis would have to state the discrepancies in these cases twice--once for V-initial roots and again for *y*-initial roots, whereas the abstract phonological analysis *predicts* that both groups or roots would be subject to similar discrepancies.

4.2. Another argument in favor of the abstract phonological solution comes from the behaviour of vowels undergoing the rule of Prenasal Cluster Lengthening (henceforth PNCL). The PNCL rule can be shown to account for the long vowels appearing in (a) the surface forms of the class 10 noun prefix /tsiN/; and (b) the vowels preceding the object marker /N/. A few examples are given in (9):

(9) /tsiN-βoolo/ → tsiimboolo 'languages'
/tsiN-siche/ → tsiisiche[4] 'locusts'
/oxu-N-chiinga/ → oxuunjiinga 'to carry me'
/oxu-N-seena/ → oxuuseena[4] 'to trample me'

Now, if we examine similar cases where a V-initial root is involved, we notice that again the vowels preceding the nasals are lengthened.[5] Notice in particular the forms given in (10):

(10) /tsiN-embe/ → tsiiñembe 'razors'
/tsiN-umu/ → tsiiñumu 'dry (cl. 10)'
/oxu-N-imba/ → oxuuñimba 'to sing me (my praises)'
/oxu-N-eng-il-a/ → oxuuñenjela 'to ripen for me'

Under the spelling rule analysis, it must be calimed that vowels are lengthened before *ñ*. But elsewhere in the language, *ñ* does not behave like a nasal cluster. First, there are no nasal-cluster-initial verb-roots in the language, but numerous *ñ*-initial verb roots exist.[6] Secondly, *ñ* does not condition PNCL elsewhere, but if it were a nasal cluster, it should do so automatically. Thus, the lengthening of vowels before ñ in the forms of (10) will have to be the result of a special rule under the spelling analysis.

With the abstract phonological analysis, the lengthened vowels in (10) would be the result of PNCL, since once the y is inserted, a nasal cluster exists:

(11)	underlying form	/tsIn-embe/	/oxu-N-imba/
	y-insertion	tsiN-y-embe	oxu-N-y-imba
	PNCL	tsiiN-y-embe	oxuuN-y-imba
	synchronic Ganda Law	tsiiñembe	oxuuñimba

4.3. The evidence from the imperative paradigm is quite compelling in favor of the abstract phonological solution, and consists of more superficial evidence. Consider the formation of the 'simple' (i.e., affirmative, singular, non-prefixed) imperative, which consists of the root plus final -a:

(12)	/βaamb-a/	→	βaamba	'sacrifice'
	/met-a/	→	meta	'Blink'
	/yaβil-a/	→	yaβila	'Bury'

Interestingly, V-initial roots surface in this paradigm with a y-inserted in initial position, with final -a:

(13)	/iβ-a/	→	yiβa	'Steal'
	/el-a/	→	yela	'Select'
	/anz-a/	→	yanza	'Arrange'
	/os-i-a/	→	yosia	'Wash up'
	/um-a/	→	yuma	'Dry'

Now, when imperatives are preceded by an object prefix, final accented e shows up, and not a:

(14)	/shi-βaamb-é/	→	shiβaambé	'Sacrifice it (cl. 7)'
	/lu-chiing-é/	→	luchiinjé	'Carry it (cl. 11)'
	/mu-βis-i-é/	→	muβisíé	'Make him pass'

But as we have seen in numerous examples in (3) and (5) above, when imperatives are preceded by the object infix /N/, final accented á surfaces. It would seem then that prefixed imperatives are split into two groups: /N/-prefixed imperatives which end in á, and all other prefixed imperatives, which end in é. Notice now that there is a similarity between /N/-prefixed imperatives and the 'simple' imperatives in that both have final a. It seems reasonable to assume that given this similarity, and the fact that /N/-prefixed imperatives are exceptional vis-a-vis other prefixed imperatives, speakers could construct /N/-prefixed imperatives in the following way: take the 'simple' imperative form (with final -a) and prefix /N/. Now, in the case of V-initial roots, the 'simple' imperative has a clearly inserted y, as (13) shows. And /N/-prefixed imperatives of V-initial roots surface with nzV or ñV. Notice therefore that in constructing these imperatives, speakers can tie together the following: (i) V-initial roots; (ii) a rule of y-insertion for V-initial roots (to construct the 'simple' imperative); (iii) an underlying nasal prefix; (iv) the surface appearance of nzV or ñV. This paradigm then provides evidence that an inserted y can be involved in the derivation of surface nzV and ñV from underlying /N/ plus V-initial root; this is the thrust of the abstract phonological analysis.

5. Discussion and Conclusion

It seems reasonable to conclude that the abstract phonological analysis can be well motivated for OluTsootso. The alternative spelling rule analysis involves a duplication of conditions on rules, and the postulation of otherwise unnecessary and unmotivated rules. The abstract phonological analysis captures generalizations, avoids duplication and unnecessary rules and conditions, and receives surface support from the imperative paradigm.

It is not the case that such a solution should be proposed for all Bantu languages with such alternations. Preliminary investigations of languages like Lomongo (Hulstaert 1961) and Lala-Wisa (Madan 1908) indicates that an abstract analysis for the nasal interactions with V-initial roots would be quite difficult to motivate. On the other hand, the nasal interactions in languages like UbuLamba (Doke 1938), Mwera (Harries 1950) and Lunyankole (Morris 1957) are reasonable candidates for an abstract phonological solution of the type proposed for OluTsootso. Of course, the exact details of these analyses may differ, and a more intense investigation of the languages than is possible from grammars is a prerequisite to any decision as regares the two solutions.

It is quite possible that languages will differ with respect to (a) how much evidence can be found for either analysis and (b) what kinds of facts will constitute actual evidence in favor of one solution or the other. For instance, the appearance of the inserted consonant in a non-nasal form paradigmatically related to a form involving a nasal is the type of evidence indicating the likelihood of the abstract analysis.[7] On the other hand, a consonant appearing after a nasal and before a V-initial root with no further alternations or no analogue elsewhere in the language would indicate that a spelling analysis be adopted.[8] Much more work would have to be done before a decision procedure could be incorporated into the metatheory of phonological investigations, but it would seem that these kinds of interactions would be a fertile testing ground for the development of such hypotheses regarding the correct description of the nasal interactions of V-initial roots.

Footnotes

[*] The data in this paper is the result of ten months of informant work with Mr. Orren Tsuma, a native speaker of OluTsootso. The work has been supported by a National Defense Foreign Language Title VI Fellowship, which also provided the informant's fees. I am grateful to Dr. Victor Uchendu of the African Studies Center at the University of Illinois for his support. The comments of Chuck Kisseberth, Herb Stahlke, Margie O'Bryan and Karen Dudas have all been most helpful.

[1] Guthrie's zone E 32 b.

[2] This rule is y → ʒ N__, and accounts for the pronunciation of /en-yeso/ as *enʒeso*, 'in plaster, in a cast'.

[3] Also called Meinhof's Law, this rule has been schematicized as NCVNC → NVNC.

[4] The nasals in these examples have been deleted via a nasal deletion rule which applies after the PNCL rule.

[5] One might question why the class 10 prefix is postulated as underlying /tsiN/ and not /tsiiN/, since it surfaces with a long vowel before both C-initial and V-initial roots. Arguments for the position taken in this paper are given in my thesis, under preparation.

[6] Only one nasal cluster-initial noun root exists, the omnipresent root for 'person' /ndu/. This root does condition PNCL: /omu-ndu/ → *omuundu* 'person'; /aβa-ndu/ → *aβaandu* 'people'. Contrast the *ñ*-initial root: /ñaas-i/: /omu-ñaas-i/ → *omuñaasi* 'troublemaker'; /aβa-ñaas-i/ → *aβañaasi* 'troublemakers'.

[7] This is the situation found in Lunyankole (cf. Morris 1957: 54, 83, 236ff.)

[8] This seems to be the situation in Lomongo (cf. Hulstaert 1961:106).

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Proceedings of the Sixth Conference on
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The Phonemic Status of Mid Tone in Ebolowa Bulu*

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1. Introduction

It has been supposed by various writers, especially Alexandre (1962, 1966), that NW Bantu languages like Bulu (A. 70 group) have no phonemic mid tone. Rather, the mid tone (henceforth M) which appears phonetically in Bulu is derived by raising underlying low tones (L), lowering underlying high tones (H), or, most importantly, contracting underlying sequences of L and H spread over two syllables into a tautosyllabic contour tone which is then converted to M. For example, the Bulu noun àwo̍m 'ten' would have the underlying representation /àwómò/, from which the surface form is derived by deletion of the final vowel, retraction of the final L to the first root syllable to form tautosyllabic HL, and conversion of this to M. Arguments for such an analysis are given in Alexandre (1962). In this paper evidence will be presented that in Ebolowa Bulu, and apparently in the Bulu described by Bates (1926), the derivation of surface M from underlying sequences of L and H by tone retraction (henceforth the "sequence analysis" of M) is not correct. Instead, a toneme /M/ must be set up along with /L/ and /H/. My arguments for tonemic M in Ebolowa Bulu (henceforth EB) are primarily formal, being based on the distribution of M in morphemes and on the complexity of the morphotonemic rules that must be used in a sequence analysis. At the conclusion of the paper, however, one small piece of "psychological" evidence for /M/ involving drum language will be given.[1]

2. Initial arguments against deriving M from tone sequences.

Alexandre's (1962) analysis of M from /HL/ runs into an immediate difficulty in EB. Consider the phrases áso̍ŋə́ dì 'this tooth' and ébɛ̍nə́ jì 'this shield', from àso̍ŋ 'tooth' and ɛ̀bɛ̍n 'shield'. The final "buffer" schwa which prevents the juxtaposition of consonants across # in these examples takes H, the root syllable M seen in the citation forms remaining. Such demonstrative phrases can be derived from underlying /LH/ noun root sequences more easily than from /HL/ sequences. All that is required is a rule (ad hoc, as it turns out) to raise the root L to M before the final H, which remains on the buffer schwa. Phonetic M on the citation forms àso̍ŋ etc. then arises via retraction of this H in the absence of buffer schwa to form tautosyllabic LH, if a sequence analysis can be maintained.[2]

The buffer ə seen in áso̍ŋə́ dì is replaced by a copy of the root vowel /o/ in the construction zá àso̍ŋó 'what sort of tooth?'; similarly we have zá mvi̍ní 'what sort of antelope?' from mvi̍n. If buffer schwa or final full vowels were taken as underlying, a support would be provided for the final H needed in a sequence analysis of M. However, final full vowels cannot be used in the underlying representations, since this would provide no means of predicting the loss of the final vowel from e.g. /èbàpá/ 'hard outer skin of suger-cane' (*èbá̍p*) in clause-final position and the retention of the final vowel of e.g. /èbàtá/ 'puddle' (èbàtá), which also has two identical root vowels, in the same environment. Therefore final schwa would have to be posited. However, schwa is not otherwise phonemic. Medial and final phonetic *ə* in words like *ébə̍lé* 'friend' are derivable from /ɛ/, shown by the surface complementary distribution of *ə* and *ɛ* in morphemes as well as by morphophonemic evidence.[3] Taking underlying final /ɛ/ in *àsó̍ŋ* etc. will not do, of course, since then these roots could not be distinguished from surface vowel-final *ébə̍lé* (/ébɛ̍lɛ́/) etc. I conclude that *àsó̍ŋ* etc. have no underlying final vowel and that buffer schwa and final full vowels are inserted by rule. This effects a savings of features in the lexicon and correctly captures the predictable nature of these final vowels.

We must therefore take the underlying form of *àsó̍ŋ* to be /àsòŋ´/, with the final H a "floating" tone. For purposes of underlying symmetry in the analysis of surface monosyllabic noun roots, Alexandre (1962) takes the underlying forms of *fám* 'man' and *mòt* 'person' to be /fám´/ and /mòt`/. This move is consistent with the fact that buffer schwa on such roots takes H after root H and L after root L (*fámə́* *nyù* 'this man' and *mòtə̀* *nyú* 'this person'), though it is not necessary, since the H and L on buffer schwa are clearly predictable. For the sake of argument, I will assume that a sequence analysis of M in EB will require underlying floating final tones for all surface monosyllabic noun roots. There is nothing inherently wrong with all these floating tones; floating tones have been posited in Hyman and Schuh (1974), and final floating stresses have been proposed in Wilkinson (to appear). EB nonetheless yields internal evidence that they ought not to be set up.

First, it turns out that only /CV̀C´/, /CV́C´/ and /CV̀C`/ noun roots can be justified in EB. Setting up /CV́C`/ roots would force an ad hoc rule to convert tautosyllabic HL to some other tone after retraction, since EB shows no roots with phonetic falling tones. Also, no root shows morphotonemic behavior derivable from intermediate tautosyllabic HL. Thus there is no evidence at all as to what phonetic tone HL should be converted to: the choice is arbitrary. To avoid these undesirable results, an MSC to the effect that floating final L doesn't occur after root H must be set up. This MSC is ad hoc, however, since /LL/, /HH/, /LH/ and /HL/ all occur regularly in roots when the final tone is supported: cf. /òkàlà/ 'mat', /èbóngá/ 'pillow', /èbàtá/ 'puddle' and /àfólà/ 'space, clearing'.[4] An even more unlikely constraint on underlying tonal patterns must be stated if final floating H after root H and L after root L, whose justification in EB is weak, are rejected in a sequence analysis of M.

More evidence against deriving M from /LH/ comes from the distribution of phonetic M in polysyllabic noun roots. In /CVCV/ or /CVCVC/ roots all combinations of L and H may occur on the two syllables. The distribution of phonetic M is not unlimited, but it is fairly wide. Thus we find /LM/, /MM/, /HM/ and /MH/; /ML/ apparently doesn't occur.[5] Consider first such nouns as *sɔ̀ŋgɔ̍* 'game played with a board and nut markers'. (The final M here is brought out by the tonal contours of *sɔ̀ŋgɔ̍ nyù* 'this songo game' and *ányàsá dì* 'this rag'.)[6] In a sequence analysis of M. the final M of *sɔ̀ŋgɔ̍* can be derived by positing an underlying form /sɔ̀n[illegible]/ and stipulating that the floating H moves only to the final syllable when retracted. But now what of words like *àsə̀lə̍k* 'cricket' and *àba̍ŋga̍k* 'type of small tree'? *àsə̀lə̍k* and *ŋgɔ̀mgba̍ŋ* 'lemon' can be analyzed in the same way as *sɔ̀ŋgɔ̍*, with underlying final floating H which is retracted only to the final L syllable, but *àba̍ŋga̍k* and *ɔ̀ba̍ŋga̍m* 'bias' present a problem. If their underlying representations are /àbàngàk´/ and /ɔ̀bàngàm´/, they must be specially marked to insure that the final floating H is retracted onto both L root syllables. Tonemic /M/ may as well replace the lexical feature needed, however. The only alternative seems to be set up underlying forms /àbàngàk´´/ etc. and stipulate that two final floating high tones are retracted to both L syllables of the root. Similarly, *èja̍ŋə̍ta̍n* 'fence with traps' would require /èjàŋɛ̀tàn´´´/. This move is not very desirable either, however, as it may raise theoretical problems regarding the definition of syllables and also leads to violation of an EB MSC.

The analysis of *sɔ̀ŋgɔ̍* as /sɔ̀ngɔ̀´/ presents a problem itself, for floating final tones were originally proposed only for surface consonant-final roots, where they supply the historical final vowels of such roots in a sense. Putting a floating H after the final vowels of *sɔ̀ŋgɔ̍* and *èŋgɔ̀mbe̍* 'native harp' in their underlying representations results in deviant forms, since EB has a general MSC prohibiting final vowel (hence tone) sequences in polysyllabic roots (this MSC is also violated by iterated final floating tones). Indeed, surface vowel-final roots never show a second final vowel when a consonant-initial word follows, so a floating final tone in their underlying representations never has phonetic justification. I conclude that vowel-final nouns not containing M, like *èsúmá* 'monkey', *èlɔ̀lè* 'tame duck', *mɛ̀vínì* 'ebony tree', etc., would be analyzed as not having final floating tones underlyingly in a sequence analysis.

Consider now nouns like *àsi̍mbá* 'trick' and *èvu̍lá* 'eyelid', which show medial M and final H. Their underlying representations will contain only one floating H, which will be retracted onto the medial L to yield the phonetic medial M. E.g. /àsìmbá´/ must then be marked as requiring retraction of floating H to the first root syllable, in contradistinction to /sɔ̀ngɔ̀´/, or the tone retraction rule must be made more complicated by explicitly mentioning the final H vowel in order to carry out the correct retraction. The latter move is clearly preferable. Rule (1) will insure that floating H is always moved over a final H vowel onto a preceding L; if there is no final H vowel, the floating H is moved to a final L vowel. (This rule does not show the additional complexity needed to move several floating H's onto L root syllables in succession.)

$$(1)\quad \begin{array}{cccccc} X & \begin{bmatrix} \text{V} \\ +\text{lowered} \end{bmatrix} & C_0^2 & \left(\begin{bmatrix} \text{V} \\ +\text{raised} \end{bmatrix} \right) & \begin{bmatrix} -\text{segment} \\ +\text{raised} \end{bmatrix} & \# \\ 1 & 2 & 3 & 4 & 5 & 6 \end{array} \Rightarrow 1 \begin{bmatrix} 2 \\ +\text{rising} \end{bmatrix} 3\ 4\ \emptyset\ 6$$

Rule (1) will work correctly in the case of representations like /èmàndák´/ 'crop of fowl', phonetically *èmǎndák*, which cannot permit retraction of the floating H to the first root syllable; since no C is specified between terms 4 and 5 of (1), the rule doesn't apply to such forms. If nouns of the form V̀CV̌CV́C exist, the underlying representation would be /V̀CV̀CV́C´´/, with both floating H's correctly moved to the two root syllables. However, in genitival constructions like /èbàtá é mɛ̀ndím/ 'puddle of water', phonetically *èbàtá mɛ̀ndím* through regressive retraction of the dependent prefix H, (1) will incorrectly move the dependent prefix H across the final H vowel of /èbàtá/ to its first root syllable L after the dependent prefix vowel is deleted (section 3).[8] To avoid **èba̍tá mɛ̀ndím* as an output, we must set up a separate rule for retracting dependent prefix tones or make (1) yet more complex. Since part of the justification for a sequence analysis of M resides in the independent need for a tone retraction rule, according to Alexandre (1962), the first alternative must be discarded. The second move cannot be accomplished by simply specifying a new term Y, with the condition that Y doesn't contain #, between terms 4 and 5 of (1), since this would also preclude the derivation of *ɔ̀kàlá fám* 'mat of the man' from /ɔ̀kàlà ó fám/. Rather, Y must be linked to the presence of term 4, such that if 4 is present Y cannot contain #. The result is a quite unnatural rule which casts doubt on the sequence analysis of M that led to its formulation.

3. Morphotonemic evidence against M from tone sequences.

The chief morphotonemic evidence for deriving M from /LH/ is the tonal pattern shown by nouns with surface monosyllabic roots in demonstrative, possessive and locative phrases. The tones on buffer schwa in *ákɔ́ʔɔ́ dàm* 'my stone' (*àkɔ́k* 'stone'), *ákɔ̍ʔɔ́ dàm* 'my trail' (*àkɔ̍k* 'trail') and *ábɔ̀ʔɔ̀ dám* 'my bush-rat' (*àbɔ̀k* 'bush-rat') give concrete evidence for final floating tones. Another piece of supposed morphotonemic evidence is that Bulu independently needs a rule of progressive tone retraction to derive, e.g. *ɔ̀kàlá fám* from /ɔ̀kàlà ó fám/ via intermediate *ɔ̀kàlà Ǿ fám*. As argued at the end of the last section, however, a single rule for deriving M and the tonal patterns of genitive constructions is complex and unnatural. Furthermore, the rule must be made even more complex to account for the fact that tone retraction to produce M must result in *addition* of H to an L syllable, whereas retraction from deleted dependent prefixes results in *replacement* of L by H. The output from e.g. /àbùm` é fám/ 'stomach of the man' must not be **àbù̍mə fám*.[9] Incorporation of this information into a "single" tone retraction rule renders the "independent support" for a sequence analysis of M virtually nil in EB.

In an analysis assuming /M/, the tones appearing on buffer schwa must be derived by rule: after *ə* is inserted, H is added if the noun root syllable is H or M, and L is added if the root syllable is L. The rule needed for this can easily group H and M together as [-lowered], inserting H after [-lowered] and L after [+lowered]. Though this rule is simple formally, it does represent a complication of the grammar of EB. However, this cost is offset in feature-counting terms by a great savings of tonal features in lexical representations, since no floating tones are needed. Also, of course, assuming /M/ avoids violations of the MSC against successive final vowels and tones in polysyllabic roots. Furthermore, we will now see that the similar behavior of H and M in causing the addition of H on buffer schwa is paralleled elsewhere in EB.

An important piece of morphotonemic evidence for /M/ comes from reduplicated nouns.[10] H and M noun roots show symmetric behavior with respect to the tones on reduplicated syllables; both seem to be at variance with L roots, which show a different pattern. For roots of CVC or CVCV form, reduplication involves copying the first C and the first V before the root. For instance, from the nouns *ɔ̀kɔ̍n* 'disease' and *kúm* 'wealth' the nouns *ŋ̀kókɔ̍n* 'sick person' and *ŋ̀ku̍kúm* 'rich person; chief' are formed. (/ɛ,ɔ/ are reduplicated as *e*, *o* and /a/ as *ɛ*.) The M root here takes H on the reduplicated syllable, and the H root takes M. This pattern is general, as shown by the class VI reduplicates *ɔ̀su̍sún* 'little fly' and *ɔ̀kʌ̍káé* 'little leaf' from /ɔ̀sún/ 'fly' and /ɔ̀káé/ 'leaf' on one hand and *ɔ̀sɔ́sɔ̍n* 'little black ant' and *ɔ̀mvɛ́mva̍k* 'small mongoose' from /èsɔ̍n/ 'black ant' and /mva̍k/ 'mongoose' on the other. Since no phonetic conditioning of the M on the reduplicated syllable of H roots is possible (cf. *ókʌ̍káé wù* 'this little leaf', where the prefix L which might have lowered a preceding H to M is itself raised to H), a morphological rule introducing M is necessary. Assuming underlying /M/, before which H is introduced on the reduplicated syllable, these facts can be described by:

$$(2)\quad +\ C \begin{bmatrix} V \\ \text{-lowered} \\ \alpha\text{raised} \end{bmatrix} C\ + \quad \Rightarrow \quad 1\ 2 \begin{bmatrix} 3 \\ -\alpha\text{raised} \end{bmatrix} 4\ 5$$

$$1\ 2 \qquad 3 \qquad 4\ 5$$

To account for the reduplication of L roots, as in *m̀bùbúm* 'pregnant woman' from /àbùm/ 'stomach' and *ɔ̀kə̀kám* 'little *akam* tree' from /àkàm/, I assume a separate transformational rule to reduplicate the root L and put H on the root. Now (2) can be formulated only if underlying /M/ is assumed. If M derives from /LH/, separate rules must be set up to reduplicate M before H roots and H before /LH/ roots. A single rule for reduplicating L and phonetic M roots can be set up in a sequence analysis if final floating tones are copied across an intervening root L (not root H), but this represents a spurious generalization, since e.g. *èlɔ̀lè* 'tame duck' reduplicates as *ɔ̀lɔ́lɔ̀lè* 'little duck', not **ɔ̀lɔ̀lɔ́lè* or **ɔ̀lɔ̀lɔ́lé*. Such a rule would have to specifically mention the absence of a vowel support for final floating tones in order not to incorrectly apply to *èlɔ̀lè* and other CV̀CV̀ roots. This is an ad hoc complication in the rule; furtnermore, a special rule is still needed to put H on L roots after reduplication in this analysis. It is better to assume (2) and a separate rule for the divergent reduplication of L monosyllabic roots. A simple rule can also be formulated for reduplicating disyllabic roots if second syllable tones, floating or otherwise, are ignored: H always appears on the reduplicated syllable (cf. *ɔ̀bə́bàtá* 'little puddle' from /èbàtá/, *ɔ̀bébə̀ŋgə* 'little bell' from /àbɛ̀ngɛ̀/, *ɔ̀kə́kátá* 'little crab' from /kátá/ and *ɔ̀vévə̀lè* 'little pool' from /èvɛ́lè/.)

Reduplication demonstrates a tonological relationship between H and M in providing support for tonemic /M/. There is a second morphotonemic process in EB which does the same thing. The words *zá* 'what' and *ébə̍* 'fellow-' require that a following noun with monosyllable root show a copy of the root vowel after the final consonant. Examples are *ébə̍ mòtò* 'fellow human being', *ébə̍ mvi̍ní* 'fellow *mvin* antelope' (as used, e.g., in a folktale) and *ébə̍ fámá* 'fellow man', as well as *zá mvɔ̀mɔ̀* 'what sort of python', *zá mva̍ʔá* 'what sort of mongoose' and *zá kúlu̍* 'what sort of tortoise'.[11] The first two examples show the same basic tonal pattern that would appear if buffer schwa had been added to the L noun /mòt/ and the M noun /mvi̍n/. However, the third example has a tonal pattern other than that seen when buffer schwa is added to the H noun /fám/, for the schwa takes H rather than M. If we have /fám´/, as required by the sequence analysis, a special rule changing final H to M when the root vowel of an H noun is copied is needed.

In an analysis that posits /M/ and no floating tones, however, the H appearing on the copied final vowel of an M root and the M on the copied final vowel of an H root are treated as a unitary phenomenon related to the tone reduplication carried out by rule (2). In fact, the vowel-copying process itself can be viewed as a kind of reduplication, so that a single rule for progressive and regressive reduplication in the appropriate morphological environments can be set up for monosyllabic noun roots, and rule (2) can be modified to carry out progressive and regressive tone reduplication for noun roots with H and M tone levels. The fact that tones on epenthetic schwa do not follow the tone copying pattern provided by modified (2) can be ascribed to the fact that epenthetic schwa is phonetically conditioned rather than an instance of reduplication.

There is also morphotonemic support for /M/ which does not rely on rule simplification due to explicit recognition of /H/ and /M/ as a toneme class defined by [-lowered]. Bulu allows several sorts of nouns to be derived from verb roots by prefixation of various noun class prefixes and change of the verb tone in some cases. Examples based on the disyllabic verb roots /bɛ́tɛ̀/ 'to lift', /tɛ́bɛ̀/ 'to stand' and /bìlì/ 'to be caught' (from /bì/ 'to catch') are *àbə́tə́* 'lifting; jack', *m̀bə́tə̀* 'one who lifts', *àtə́bə́* 'standing; stand', *ǹtə́bə̀* 'one who stands', *àbìlí* 'a place where one is caught', and *m̀bìlì* 'one who is caught'. Thus gerunds are formed by changing the final tone of the verb root (always L) to H. This is also borne out by longer derived verb forms, such as *bòmòlò* 'to hammer' (/bòm/ 'to strike'), which forms the gerund *àbòmòló* 'hammering' as well as the agentive noun *m̀bòmòlò* 'one who hammers'.

Considering monosyllabic verb stems, we find that derived nouns often show a change from verb L to M. This is seen in àfu̍m 'whiteness' from /fu̇̀m/ 'to be white', èdu̍ŋ 'rustling' from /du̇̀ŋ/ 'to rustle' and àdi̍p 'being obstructed' from /di̇̀p/ 'to obstruct'. Of these, the second, with the class V singular prefix /è-/, is not formed by a regular pattern, but the other two represent the usual class IV gerund. Such forms appear at first to support the derivation of M from /LH/: the rule changing final L of disyllabic verb roots to H in the formation of gerunds can be extended to add a final floating H after monosyllabic L verb roots, and the normal tone retraction process will derive the M of the nominals. However, there are two problems with this.

First, although all disyllabic verb roots show raising of their final L to H in the formation of gerunds, not all monosyllabic L roots change this L to M in gerunds. Examples are àkàp 'sharing' from /kàp/ 'to share' and àvàk 'rejoicing' from /vàk/ 'to rejoice'. The retention of L here does not appear to be predictable on phonological grounds, so such roots must be marked not to undergo the rule adding final H. However, there are so many monosyllabic L verb roots which fail to undergo the rule that they cannot very well be treated as phonological exceptions. This, plus the fact that there are no exceptions among the disyllabic verb roots, makes it likely that two different rules are involved, that for disyllabic roots being essentially phonological and that for monosyllabic roots morphological. Such an analysis is supported by the fact that many M gerunds coming from L verbs are idiosyncratic regarding prefixation, like èdu̍ŋ above and ɔ̀kɔ̍n 'disease' (class VI), related to /kɔ̀n/ 'to be sick'.

Further evidence that morphological rules are involved in the derivation of mid tone monosyllabic deverbal nouns comes from the fact that nouns formed with class I or class II prefixes often show M when monosyllabic L verb roots are the source. Thus from /jùk/ 'to be bothered' and /fùk/ 'to mash' the class II nouns ǹju̍k 'bother' and m̀fu̍k 'mashed food' are formed (compare ŋ̀kùs 'purchase' from /kùs/ 'to buy'). Class I and II nouns formed from disyllabic verb roots never show raising of the final L, however, as shown by m̀bə́tə̀ etc. above (class I) and by ŋ̀kɔ́bɔ̀ 'talk' (class II) from /kɔ́bɔ̀/ 'to talk'. Hence we must have a special rule to derive the mid tones on the nominals from monosyllabic verbs. (The rule deriving class IV gerunds is obviously irrelevant, since classes I and II are involved.) Because many class I or II nominals from L monosyllabic verbs retain the verb L, such as ŋ̀kùs 'purchase' from /kùs/ 'to buy', this rule must furthermore be morphological. Rather than add floating H to the L verb roots undergoing it, which requires a more complex rule unsupported by other data, the rule may better change L to M by simply respecifying [+lowered] as [-lowered] in the context of morphemes marked to undergo it. The same is true of the morphological rule needed in the derivation of class IV gerunds and isolated nominals like ɔ̀kɔ̍n. All of this, in turn, supports tonemic /M/, since segments or suprasegments derived directly by morphological rules are by definition phonemic. An intermediate stage /LH/ has been eliminated here, forcing M into the status of a toneme.

4. Conclusion

It has been shown in the preceding sections that the optimal formulation of several EB morphotonemic rules seems to require underlying /M/ along with /L/ and /H/ and that the distribution of M in EB morphemes is such that a sequence analysis of this tone is rather contrived. None of this evidence forces us unconditionally to give up the more abstract sequence analysis of M; rather it only gives a strong indication that the sequence analysis is wrong and that EB has phonemicized a mid tone. One might expect EB to further restructure the distribution of M in morphemes and further level morphotonemic processes pointing to /LH/ rather than /M/ if this tone is now tonemic, however. For example, a spread of M into the first syllables of disyllabic noun roots with second syllable L (see fn. 6) would destroy the possibility of a sequence analysis for M. Similarly, a spread of M into verbal morphotonemic patterns might have such an effect. As far as I can tell, EB verbs in isolation mainly contrast in only L and H, but there are a few verb roots which seem to show M in isolation or clause-finally, examples being di̍ 'eat' and yɛ̍n 'see' (cf. bà 'cut into pieces', di̍ 'eat' and fák 'dig'). I have found no cases where this apparent M occurs in context, however. One might expect /M/ to spread into verb roots more pervasively. Only observation of the future development of EB could provide this kind of evidence for tonemic /M/.

Tonemic /M/ might also be supported by evidence from borrowing. For instance, if /CV̀Cə́/ noun roots from some neighboring language characteristically lost the final /ə/ in EB but did not uniformly develop M on the resulting monosyllabic root (e.g. retained L on the root in a high proportion of cases), this would presumably constitute evidence that a rule converting /LH/ to M is not a synchronic part of EB. At present, unfortunately, I have no data of this sort.

There is one piece of evidence exterior to the structure of EB itself which does suggest a phonemic mid tone, however. This comes from drum language as practiced at Ebolowa. Alexandre (1969) and von Hagen (1914) both state that only H and L are sounded in Bulu drum language, and the former says this indicates that Bulu has only these tones as tonemes. My informant, who has more than average familiarity with and interest in drum language (his uncle being a drummer), tells me that a skilled drummer will in fact sound M as well as L and H. An example showing all three lexical tone levels is za̍ʔá wɔ̍ wùlù étɔ̍ jì 'come quickly' (lit. 'come, you walk this seat/place') from /zù+ák wɔ wùlù e̍tɔ̍ jì/, where the M on the root of /e̍tɔ̍/ 'seat' is drummed along with the underlying and derived H's and L's in the rest of the sentence. On the other hand, tonetic M derived from /H/ by downstepping is not drummed, according to Mr. Etua, though in a short example like à ŋgáá !wú 'he may die' from /a ngáá wú/ (compare à ŋgá wú 'he died' from /a ngá wú/) the derived M on wu̍ would not be impossible to render, even if this sentence were embedded in a longer drummed expression. Since EB drum language seems to reproduce lexical (contrastive) M regularly, but not the noncontrastive downstepped H, Alexandre's own argument may indicate that the former has a "psychologically real", i.e. tonemic, status in the language.[12]

Footnotes

*My thanks to Mr. Joseph Etua and his wife, Philomene, of East Lansing, Michigan, who have been kind enough to help me as informants for Bulu during the last several months. Both are from Ebolowa, Cameroon. Thanks are also due to Morris Goodman of the Linguistics Department, Northwestern University, for his helpful comments on and criticisms of the style and content of this paper.

[1] Some of my data is drawn from Bates (1926), with corroboration from Mr. Etua. In general, the Bulu described by Bates correlates closely with Mr. Etua's speech; both forms of Bulu seem to diverge considerably from the language described by Alexandre (1962, 1966) in tonetics and tonology. For instance, Alexandre (1962) scarcely recognizes mid tone on nouns, whereas I have found large numbers of minimal noun pairs and even triples which are distinguished by M vs. L and/or H. When Alexandre does show M on a surface monosyllabic noun root, he derives it from an underlying sequence /HL/, which never appears phonetically on a single syllable, but he does not definitely decide whether the final L is to be supported by a vowel. Alexandre (1962) also posits underlying /CV́C´/, /CV̀C`/ and /CV̀C´/ roots, possibly with final vowels, which result in H, L and rising tone surface roots respectively. As stated below in the text, this is done largely to establish symmetry in the underlying forms of nouns (all are "disyllabic") and to bring Bulu into conformity with usual Bantu root structure. Disposing of tonemic /M/ and rising tone in favor of /HL/ and /LH/ spread over two syllables also makes Bulu tonal structure look more like the usual two tone Bantu system.

The tonal features used in this article are taken from Fromkin (1972). To save space, I do not indicate a morpheme boundary between noun prefixes and roots. Singular prefixes are either single vowels or nasals, and thus easily recognizable.

[2] Deriving M from /LH/ is correct etymologically, for Bulu monosyllabic noun roots in M are generally cognate to Ewondo roots with a rising tone (e.g. Bulu àso̍ŋ 'tooth' and Ewondo àsǒŋ). The absence of phonetic rising tone on any EB monosyllabic roots makes it possible to automatically convert tautosyllabic LH to M. Historically, the EB M monosyllabic roots were no doubt disyllabic with L on the first syllable and H on the second, the latter containing full vowels which were later weakened and lost. The ancestors of EB monosyllabic roots with other tones would also be disyllabic, undergoing the same truncation (see Alexandre's generalized analysis of surface monosyllabic roots, which reflects these changes, as outlined in footnote 1).

I also point out here that prefix L on nouns is raised to H in demonstrative, possessive and locative phrases: hence áso̍ŋə́ dì 'this tooth' from /àsòŋ´ di/ in a sequence analysis. The tone on the demonstrative adjective /di/ is derived by a general rule.

[3] The allophones of /ɛ/ actually present a more complicated picture. ɛ appears before non-velar nasal consonants; ʌ appears before velar consonants and word-finally; a rather fronted mid central vowel occurs elsewhere. These details do not affect the arguments in the text.

[4] Such an MSC is not needed for the Bulu described by Alexandre, where there is evidence for underlying /CV́C̀/ as well as the three other possible disyllabic combinations of L and H (see footnote 1).

[5] Bates (1926) shows a few nouns, such as *zo̍mbò* 'old male mandrill', which seem to have second syllable M and final syllable L. However, I have not been able to reproduce this data. After much probing and discussion, Mr. Etua and I tentatively conclude that ML roots do not exist in EB. There are nouns like *ébándá* 'bridge' and *ékáŋgá* 'native hospitalization' which sometimes seem to show second syllable M when pronounced in isolation, but this M always disappears in context. If EB is moving away from underlying /LH/ toward /M/, it is perhaps not surprising that ML roots should be the last to appear, since these are derivationally least compatible with the original /LH/ (section 4).

[6] In general, the pitch contour of a demonstrative etc. phrase having a noun head with a supported high tone seems to be uniformly higher than the contours of phrases whose heads have only supported M or L tones. Thus the contour of *ákɔ́ʔɔ́ dì* 'this stone' below in the text, from /àkɔ́k di/, is higher than that of *ákɔ̍ʔɔ́ dì* 'this trail', from /àkɔ̍k di/, even though tones that must be considered H occur phonetically in both. Likewise the contours of *áfɛ́ndə́ʔə́ dì* 'this linden tree' and *émàndáʔá jì* 'this crop' (/èmàndák/) are higher than those of *ásələ̍ʔə́ dì* 'this cricket' (/àsɛ̀lɛ̍k/) and *ába̍ŋga̍ʔá dì* 'this *abangak* tree' (/àba̍nga̍k/); *ányàsá dì* differs similarly from *(ə́)sɔ̀ŋgɔ̀ nyù*. This "high contour" vs. "mid contour" and "low contour" makes it easy to distinguish the difference between supported /H/, /M/ and /L/ in context. Some kind of rule which raises the pitch of entire phrases must be posited when supported /H/ is present.

In *ákɔ́ʔɔ́ dì* above /k/ shows regular conversion to *ʔ* intervocalically: a copy of root /ɔ/ appears finally after this *ʔ* rather than buffer schwa.

[7] We may assume that the leftmost floating H would always be moved to the first root L syllable in these examples, with the rightmost floating H remaining behind on buffer schwa if it is inserted. Note that a properly generalized version of (1) is needed to retract the floating H of /èmàndák´/ to the final H syllable.

[8] The application of (1) cannot be blocked here by ordering a regressive tone movement rule before (1), since forms like *àwùtá bə́fám* 'bad luck (in hunting) of the man' from /àwùtà é bɛ̀fám/ show both progressive and regressive tone movement, thus requiring simultaneous application of the rules.

[9] I note here that in all the morphotonemic arguments in this section one might get around the evidence for tonemic /M/ by ordering the tone retraction rule before the morphotonemic rules involved. Such a use of ordering is plainly intolerable in the absence of independent motivation for the required order, however. Furthermore, such a move is bound to fail anyway, since the tone retraction rule itself gives some evidence for tonemic /M/. In particular, when the H of a dependent prefix is retracted onto the final L vowel or buffer schwa of a preceding noun, this H is

lowered to M when the first tone of the following noun is L. Thus we have *àbùmə̍ mòt* 'stomach of the person' from /àbùm é mòt/, but *àbùmə́ kꜝɔs* 'stomach of the fish' and *àbùmə́ fám* 'stomach of the man'. Since nouns with a final H vowel do not show such lowering in genitival constructions (cf. *ànyàsá mòt* 'rag of the person'), it cannot be phonetically conditioned, and must be made part of the tone retraction rule. Both the environment and the structural change of the latter can be formulated more simply if /M/ is assumed. Hence we must have two separate retraction rules in a sequence analysis of M if /LH/ is to be converted to M before retraction of H from dependent prefixes occurs.

[10] Reduplication is productive in Fang, and rather productive in EB, but apparently not so productive in more northly dialects of Bulu. My informants accept the examples below in the text, though they find some of them a bit unusual. The MH tonal pattern on *ɔ̀sꜝúsún* 'little fly' from /ɔ̀sún/ etc. is noted by Good (1936), but not by Alexandre (1966).

[11] The final H of *mviní* here seems to fall slightly, though this fall is not so noticeable in the case of e.g. *zá mvàꜝʔá* 'what sort of mongoose?' from /zá mvák/. I assume that a special variable rule applies to derive the slight fall on final H in these constructions after the H is inserted by modified (2). The same fall is derived on the final supported tones of *kátá* 'crab' and *sɔ̀ŋgꜝɔ́*.

EB proper names like *Àkꜝɔ́nɔ̄* (*àkꜝɔ́n* 'pillar') and *Àsꜝóŋó* (*àsꜝóŋ* 'tooth') also show reduplicated final vowels. Alexandre (1962) takes proper names to be evidence for his sequence analysis, but in fact they present a problem for a sequence analysis in EB, since a few M monosyllabic noun roots are related to names with an HL sequence (cf. *Àwómò*, related to *àwꜝóm* 'ten'). Such data makes it impossible to tell what tone sequence M should come from in EB. (Note that *àwꜝóm* shows normal M root behavior in *àwꜝómə́ fɔ́n* '10 ears of corn'.) I assume that the EB proper names are separate lexical entries related to corresponding common nouns by redundancy rules of some sort. This analysis is supported by the fact that the names are not analyzable into prefix plus root: the plural of *Ɔ̀yɔ̀n* (related to /ɔ̀+yɔ̀n/ 'dry season') is not **Àyɔ̀n* (cf. /à+yɔ̀n/ 'dry seasons') but rather *Bɔ̀yɔ̀n* from /bɛ̀+ɔ̀yɔ̀n/, gotten by adding the class I plural prefix /bɛ̀-/ to *Ɔ̀yɔ̀n*, as in *Bɔ̀yɔ̀n bəbaꜝé* 'two people named Oyon'. Likewise 'this Oyoŋ' is *Ɔ̀yɔ̀nə̀ nyú*, with class I singular adjective *nyú*, rather than **Ɔ̀yɔ̀nə̀ wú*, which one would expect if initial *ɔ̀* here were the class VI singular prefix.

[12] It seems clear that EB drumming could not reproduce downstep and downdrift over long stretches of speech, since this would require too many tonal distinctions on the drum. The reproduction of tonetic variants like downstepped H (nonconstrastive since e.g. /ngáá/ 'future' is distinguished from /ngá/ 'past' by vowel length) over short stretches cannot be ruled out a priori, however. Jack Berry (personal communication) informs me that phonetic phenomena like gliding tones are represented in Akan drum language.

It is also noteworthy that Bulu /M/ undergoes downstepping just as /H/ does. This is shown by the difference between à ŋgáá wɔ̀ꜝˀɔ̀ꜝ !nɔ̀ꜝn, 'he may hear the bird' from /a ngáá wɔ́k ɔ̀nɔ̀ꜝn/ and à ŋgá wɔ́ˀɔ́ nɔ̀n 'he heard the bird' from /a ngá wɔ́k ɔ̀nɔ̀ꜝn/.

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Some Problems with Binary Features for Tone*

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1. Introduction

In this paper I will attempt one of the easier of linguistic tasks, that of falsifying a linguistic hypothesis without providing a better alternative. In this case, the attempt is not in the nature of taking a cheap shot since it focuses attention on problems inherent in a fundamental assumption of modern linguistic research, the tenet that phonological contrasts are to be described by binary systems. In particular, I will be arguing that the phonological representation of tone in binary features is inadequate for either synchronic or diachronic description. I will begin by reviewing the major feature frameworks for tone in use today, showing each to make incorrect claims for some languages, while correctly accounting for phenomena in others. I will then discuss data from Igede and Proto-Mixtecan, which show binary features to be formally unworkable.

I assume two criteria to be essential to any framework for describing the sounds of natural language. A phonetic theory of natural language must be capable of describing all of the phonetic contrasts found in natural languages and should exclude any sounds and sound-generating mechanisms which are not used in natural language. Thus it must include consonants involving a velaric ingressive airstream mechanism, but it must exclude sounds produced with an esophageal egressive airstream mechanism even though this is the normal airstream mechanism for persons who have undergone the surgical removal of the larynx. No natural language contrasts esophageal egressive and pulmonic egressive sounds. Secondly, phonetic descriptions must reflect at least the articulatory or the acoustic properties the sounds of natural language and must do so in ways that reflect the classifications of sounds that are possible in natural language. Any phonetic theory which fails to meet at least these two criteria is inadequate as a phonetic theory of natural language.[1]

Linguists dealing with the phonological analysis of tonal languages have generally used one of four systems of representing tone levels. The oldest and perhaps most widely used of these treats a tone level as a point on a scale. This system is typified by Chao's (1930) system of tone letters (1), which distinguished five pitch heights.

(1) Chao's 'Tone Letters' (partial List) (1930)

Pitch	1	2	3	4	5
Letter	˥	˦	˧	˨	˩

Similar systems have been employed in American Indian languages, especially in the work of Pike and his associates (cf. Pike (1947)). Such scalar systems make no claims about the naturalness of tonal systems or of phonological rules for tone and hence have been neglected by generative phonologists in favor of binary feature systems. However, Chao's fundamental observation that no more than five levels of pitch are needed in the phonological description of any language has been incorporated into all binary systems for tone which have been seriously explored.[2] The three feature systems discussed in this paper have all used features defined in such a way that certain logically possible combinations, such as Woo's [+High Tone, +Low Tone], are excluded as being articulatorily impossible. That is, the features describe intersecting, rather than hierarchical, phonetic properties. In no system is there a feature which has the effect of raising or lowering any tone which the system can otherwise describe, thus doubling or quadrupling the number of phonologically necessary pitches in a language to ten or twenty. This is obviously a well-motivated limitation. I will assume, therefore, for purposes of discussion, that a feature system for natural language tone must account for five levels of pitch and will use intersecting, rather than hierarchical, features to do so.

2. Wang's feature system

The earliest set of features for tone to receive wide-spread attention is that proposed by Wang (1967). He proposed the features [±High], [±Central], and [±Mid], and argued for the following system.

(2) Tone features according to Wang (1967)[3]

Pitch	1	2	3	4	5
High	+	+	-	-	-
Central	-(U)	+(M)	+(M)	+(M)	-(U)
Mid	-(U)	-(U)	+(M)	-(U)	-(U)
Complexity	1	2	3	2	1

Wang's system makes the claim that the simplest and most natural tonal system will have two distinctive pitch levels, pitch _1_ [+High, -Central, -Mid), and pitch _5_ [-High, -Central, -Mid]. A system of three tones would optionally include pitch 2 [+High, +Central, -Mid] or pitch 4 [-High, +Central, -Mid]. The implication of his markedness system is that a true mid tone would be found only in a system of at least four tones, since mid tone, that is, pitch 3, is more highly marked than either pitch 2 or pitch 4. It is not difficult to falsify this particular claim with African data. In Nupe (George (1970)), for instance, a syllable may have any of three tones on it, high tone (Wang's pitch 1), mid tone (Wang's pitch 3), or low tone (Wang's pitch 5). The fact that the middle tone must be [-High] is indicated by the fact that [+High] tones in Nupe become low-high rising when preceded by a low tone and a voiced consonant. The Nupe mid tone does not undergo this assimilation.

(3)	èdu	'yam'	Low-Mid
	èbǔ	'cross'	Low-High
	èfú	'honey'	Low-High

(George (1970:103-105))

The middle tone cannot be [-Mid], since there is a raised variant of low tone found in certain environments which is between low tone and mid tone.[4]

(4) u dà zà̃ dà → u dà: zà̃ dà [- - - _]
He walked walk
'He actually walked.'
(George (1970:120))

In Wang's framework, this tone would have to be specified [-High, +Central, -Mid]. This derived tone, however, is less highly marked than the distinctive mid tone, and thus Wang's framework makes an incorrect prediction for Nupe.

3. Woo's feature system

A system which would seem to work better for Nupe, as well as for many other African languages, is that proposed by Woo (1969). Her feature complexes for the same five pitch levels use the features [±High Tone], [±Low Tone], and [±Modify], as shown in (5).

(5) Tone features according to Woo (1969)

Pitch	1	2	3	4	5
High	+(M)	+(M)	-(U)	-(U)	-(U)
Low	-(U)	-(U)	-(U)	+(M)	+(M)
Modify	-(U)	+(M)	-(U)	+(M)	-(U)
Complexity	1	2	0	2	1

Woo's framework correctly predicts that Nupe alternation described above will be a natural alternation, as illustrated in (6).

(6) $[+\text{Low}] \rightarrow [+\text{Modify}] \;/\; \_\_\; [+\text{Low}]_{1}^{n} \;\#\#$

Her features seem to work well for many African languages, including Yoruba, Ewe, Igbo, and Bambara, to mention just a few. Woo faces difficulty, however, in describing a four-level system such as that found in Igede (Bergman (1971)). I will identify the tones by letters a-d, with a being the highest. Her marking scheme prevents a natural choice for the fourth tone, but it will require either that both middle tones be highly marked or that one be unmarked and the other highly marked. Igede exhibits four levels of lexical tone, as shown in (7).

(7) ɔ^{b} hʊ^{a} lɛ^{d} 'He has washed.'
ɔ^{b} hʊ^{b} lɛ^{d} 'He has stayed.'
ɔ^{b} hʊ^{c} lɛ^{d} 'He has scattered.'
ɔ^{b} hʊ^{d} lɛ^{d} 'It has flown.'
(Bergman (1971:16))

Igede also exhibits a number of complex alternations between tone levels. A final tone d on a verb becomes tone c before an object pronoun.

(8) kpɔ^{d} + ɔ^{c} → kpɔ^{c} + ɔ^{c}
satisfy him
(Bergman (1971:19))

All CV^{c}CV^{c} verbs become CV^{c}CV^{a} before object pronouns.

(9) bɩ^{c}rɩ^{c} + ɔ^{b} → bɩ^{c}rɩ^{a} + ɔ^{b}
spoil it
(Bergman (1971:19))

All CV^{a}CV^{b} verbs become CV^{a}CV^{a} before an object pronoun.

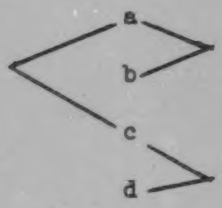
(10) kʊ^{a}rʊ^{b} + ɔ^{b} → kʊ^{a}rʊ^{a} + ɔ^{b}
cover it
(Bergman (1971:19))

Some CV^{c} verbs become CV^{a} before an object pronoun.

(11) do^{c} + ɔ^{b} → do^{a} + ɔ^{b}
abuse him
(Bergman (1971:19))

Thus Igede has d/c, b/a, and c/a alternations, as illustrated in (12).

(12) Igede tonal alternations



Since tones *b*, *d* and some instances of *c* raise before object pronouns, one would like to capture a generalization of tone raising, but such a generalization steadfastly resists formalization in features, as the following exhaustive list of possibilities illustrates.

(13) (i) Igede feature analysis I

Tone	a	b	c	d
High	+	+	-	-
Low	-	-	+	+
Modify	-	+	+	-

(ii) $CV^{d} \rightarrow CV^{c}$

$[-Mod] \rightarrow [+Mod] \ / \ [+\overline{Low}] + Pronoun]_{V}$

(iii) $CV^{b} \rightarrow CV^{a}$

$[+Mod] \rightarrow [-Mod] \ / \ [+\overline{High}] + Pronoun]_{V}$

(iv) $CV^{c} \rightarrow CV^{a}$

$\begin{bmatrix} +Low \\ +Mod \end{bmatrix} \rightarrow \begin{bmatrix} +High \\ -Mod \end{bmatrix} \ / \ \_\_ \ + Pronoun]_{V}$

Rules (13ii) and (13iii) could conceivably be collapsed using α variables, as in (14)

(14) $[\alpha Mod] \rightarrow [-\alpha Mod] \ / \ \_\_ + Pronoun]_{V}$

Even if no objection is made to the α-switching formalism, (14) is a most unusual way of saying that the tone of the verb raises before a pronoun. Other possible feature analyses for the four Igede tones are shown in (15).

(15) (i)

Tone	a	b	c	d
Pitch	1	2	3	4
High	+	+	-	-
Low	-	-	-	+
Mod	-	+	-	+

(ii)

Pitch	1	2	3	5
High	+	+	-	-
Low	-	-	-	+
Mod	-	+	-	-

(iii) Pitch	1	3	4	5
High	+	-	-	-
Low	-	-	+	+
Mod	-	-	+	-

(iv) Pitch	2	3	4	5
High	+	-	-	-
Low	-	-	+	+
Mod	+	-	+	-

The corresponding variants of (14) are shown in (16).

$$(16)\quad (\mathrm{i})\quad [+\mathrm{Mod}] \rightarrow [-\mathrm{Mod}]\ /\ \underline{\quad} + \mathrm{Pronoun}]_V$$

$$(\mathrm{ii})\quad [\alpha\mathrm{Mod}] \rightarrow \begin{bmatrix} -\alpha\mathrm{Mod} \\ -\mathrm{Low} \end{bmatrix}\ /\ \underline{\quad} + \mathrm{Pronoun}]_V$$

$$\left\{ \begin{array}{l} [-\mathrm{Low}] \rightarrow [+\mathrm{High}] \\ [+\mathrm{Low}] \rightarrow [+\mathrm{Mod}] \end{array} \right\}\ /\ \underline{\quad} + \mathrm{Pronoun}]_V$$

$$(\mathrm{iv})\quad [-\mathrm{Mod}] \rightarrow [\ \mathrm{Mod}]\ /\ \underline{\quad} + \mathrm{Pronoun}]_V$$

A comparison of (15) with (16) indicates that the simpler rules (16i) and (16iv) require the most complex feature analyses (15i) and (15iv), and the more complex rules (16ii) and (16iii) allow the less complex feature analyses (15ii) and (15iii). The relatively complex rule (14) requires the most complex feature analysis (13i). In none of the possibilities as (13iv) collapsible with the other two rules. What seems to be a relatively simple alternation in Igede cannot be described simply with Woo's features. The same is true of Wang's features, but the demonstration of that can be left as an exercise.

4. Maddieson's feature system

The third feature system for tone is that described in Maddieson (1971), using the features [±Raised], [±Lowered], and [±Extreme]. The features [±Raised] and [±Lowered] correspond directly to Woo's [±High Tone] and [± Low Tone], but [± Extreme] specifies unusually high or low pitches. Such tones are found often in the languages of Ghana, Togo, and Dahomey, for instance Avatime (Ford (1971) and Ewe (Westermann (1930)). The auditory impression of these tones is that they are indeed extreme high or extreme low tones, but this effect is not noted by Pike (1967) or Bergman (1971) for Igede, and seems in general to be unusual in the Kwa languages of Nigeria. The tones described by Maddieson's features are shown in (17). 1' and 5' indicate extreme high and extreme low pitches. Woo's feature [± Modify] is added parenthetically to indicate how the two systems could be merged. The markedness values have been added by the present writer and are not suggested in any way by Maddieson.

(17)

	1'	1	(2)	3	(4)	5	5'
Raised	+(M)	+(M)	+(M)	-(U)	-(U)	-(U)	-(U)
Lowered	-(U)	-(U)	-(U)	-(U)	+(M)	+(M)	+(M)
Extreme	+(M)	-(U)	+(M)	-(U)	-(U)	-(U)	+(M)
(Modify	-(U)	-(U)	-(U)	-(U)	+(M)	-(U)	-(U))
Complexity	2	1	2	0	2	1	1

While it may be the case that (17) represents a possible universal set of phonological features for tone, it is clearly no more adequate for Igede than is Woo's system. Maddieson's system by itself cannot describe pitches 2 and 4, pitches that are needed for Igede and Nupe, to mention only two cases. The combined system in (17) is inadequate also in that it predicts tonal systems of six and seven distinctive levels. No clear cases of such systems are attested.

5. Igede diachronic tone change

Not only does Igede present a problem for synchronic description, but it poses diachronic problems as well. The internal reconstruction of the contemporary Igede four-level system back to an earlier two-level system is relatively transparent. The four tones fall into three pairs of alternants, as shown in (12) above. Tones a and b alternate, b becoming a in CV^aCV^b verbs before an object pronoun; tones c and d alternate, d becoming c in all CV^d verbs before an object pronoun; and tones c and a alternate, c becoming a in all CV^cCV^c and some CV^c verbs before an object pronoun. This patterning suggests that in an earlier stage of Igede there were only two tones, a higher tone, which I will designate A, and a lower tone, which I will designate C. Each of these tones later split into a higher and a lower variant, a/b and c/d, respectively, resulting in the contemporary four-level system. The a/c alternation reflects an earlier stage in which the two tones A and C were realized as A in some environments. One case of this would have been the earlier reflex of the CV^cCV^c/CV^cCV^a alternation.

This reconstruction is supported by the tonal behavior of object pronouns. Verbs ending in reflexes of earlier tone A, now tones a and b, condition tone b on the pronoun.

(18)		
	ba^{a} + ɔ^{b}	'follow him'
	hɔ^{b} + ɔ^{b}	'affect him'
		(Bergman (1971:20))

Verbs ending in reflexes of earlier tone C, now tones c and d, condition tone c on the pronoun. As noted above (8), tone d becomes tone c before an object pronoun.

(19)		
	kpɔ^{c} + ɔ^{c}	'satisfy him'
	ha^{c} + ɔ^{c}	'give to him'

The tone of the object pronoun is fully predictable and is sensitive only to a two-way tonal contrast--between the tones which I have designated A and C.

The splitting of A into a and b and of C into c and d presents a diachronic enigma directly paralleling the synchronic problem discussed in detail above. None of the binary feature systems presented earlier can offer a natural account of these diachronic changes, just as they were inadequate for a synchronic account. The development of such a two-way tonal contrast into a four-way tonal contrast is conceptually simple, but its description requires a framework in which a tonal spectrum divided into two ranges can be subdivided into four ranges. Such a description is not feasible in a binary framework, since binary systems predict natural tonal systems of two, three, or five levels. Systems of an even number of tones, where the number is greater than two, inevitably involve some kind of an asymmetric relationship between the tones, but the Igede tonal system of two pairs of alternating tones is not asymmetric.

6. Mixtecan diachronic tone change

The Mixtecan languages of Mexico (Longacre (1957)) exhibit tonal systems similar in some ways to those of Africa. Trique in particular has frequently been cited as an instance of a five level tonal system (Woo (1969)). However, the five levels of Trique and their correspondences in other Mixtecan languages present difficult problems for description in the feature frameworks presented earlier. Longacre (1957:103A) presents the following tone correspondences in Mixtecan languages.

(20) Tone correspondences in Mixtecan languages

Mixtec (San Miguel)		H	M		L
Mixtec (San Estaban)		H	M_1	M_2	L
Cuicatec		H	M		L
Trique	H_1	H_2	M_1	M_2	L

Longacre points out that in Trique and Mixtec (San Estaban) the pitch intervals between M_1, M_2, and L are much smaller than those between H and M. This follows from the fact that most M_2 represent lowered M_1. Trique H_1 arises consistently from a H_2 + /ʔ/ sequence, with the glottal stop deleted and the pitch level raised.

The Trique system cannot be adequately described by Woo's articulatory features, since H_1 and H_2 would have to be [+High, -Modify] and [+High, +Modify], respectively. The correspondences with other Mixtecan languages would then force the conclusion that the loss of final glottal stop after a high tone vowel resulted not in the raising of the high tone, a phenomenon which is well-attested in Asian and African tone languages, but in the lowering of all high tones not originally followed by a glottal stop. This is, of course, an intolerable consequence. Trique could, perhaps, be described by the framework in (17), specifying H_1 as [+Extreme] and H_2 as [-Extreme, -Modify], but this would only be an expediency. The phonetic effect of glottal closure is frequently a raising of adjacent pitches. Thus any of the three lower tones could also have been raised by the loss of a final glottal. That this did not happen does not provide support for such an analysis. What weakens this analysis is the fact that extreme high tones in Kwa languages are not due to the loss of a final glottal. Thus tone raising conditioned by glottal constriction is not properly described by any of the features so far discussed.

Longacre (1957:93) also reconstructs a Trique noun suffix bearing a mid tone, tone 3 in a five-level system. His evidence for this is illustrated in (21).

(21) yo^{3ʔ}o^{3} 'year' ~ yo^{3ʔ} ga^{3}cị$^{2-3}$ 'the past year'

na^{3}kɨ̣^{4}hɨ̣$^{4-3}$ 'atole' ~ na^{3}kɨ̣^{4}h ru^{4}ne$^{4-3}$ 'bean atole'

ka$^{1-2}$ 'bone' ~ ku$^{2-1}$ a^{3}wi^{3} 'skull'

te^{2ʔ}lo^{5}ho$^{5-4}$ 'rooster' ~ te^{2ʔ}lo^{5}h l·i^{3}h 'a little rooster'

gwi^{3} ža$^{5-3}$ 'the eleventh day' ~ žą^{5} gwi^{3} 'eleven days'

yą$^{3-4-3}$ 'salt' ~ yą$^{3-4ʔ}$u$^{1-2}$ 'coarse salt'

gwi^{3-5-4} 'people' ~ gwi$^{3-5}$ za^{5ʔ}a$^{5-3}$ 'nice people'
(Longacre (1957:77-78))

The phrase-final variants of the nouns, shown in the left examples in (21), all exhibit a shift towards tone 3. In positions other than phrase-final, the final tone disappears. He then posits an earlier Trique -V^{3} suffix which was added to phrase-final nouns and later disappeared from Trique morphology, leaving behind only phonological alternations. This suffix still shows up as -a^{3} in some Trique dialects. What is involved are the following tonal alternations on the final syllable of nouns.

(22)

sandhi form	phrase-final
2-1	1-2
4	4-3
3	3-3
5	5-4/3
3-4	3-4-3
3-5	3-5-4

In each case the tone glides one level closer to tone 3. Tones 3 and 4 glide to 3, and tones 1 and 5 glide to 2 and 4 or 3, respectively. If all tones glided to 3 or became 3, there would be no difficulty writing a rule for the change with binary features, but since the glide is not to a mid level but toward a mid level, a rule using binary features cannot express the proper generalization. An attempt at such a rule, using Woo's features, is given in (23) to illustrate the complexity involved.

$$(23)\ \left\{\begin{array}{ll}
[-\text{Mod}] \rightarrow [+\text{Mod}]\ / & \left[\left\{\begin{array}{l}\overline{[+\text{High}]}\\ {[+\text{Low}]}\end{array}\right\}\right] \\
\left(\left\{\begin{array}{l}\begin{bmatrix}+\text{High}\\ +\text{Mod}\end{bmatrix} \rightarrow \begin{bmatrix}-\text{High}\\ -\text{Mod}\end{bmatrix}\\ \begin{bmatrix}+\text{Low}\\ +\text{Mod}\end{bmatrix} \rightarrow \begin{bmatrix}-\text{Low}\\ -\text{Mod}\end{bmatrix}\end{array}\right\}\right) / & \underline{\qquad}
\end{array}\right\} \left[\begin{bmatrix}-\text{High}\\ -\text{Low}\\ -\text{Mod}\end{bmatrix}\right]_{N} \quad \begin{array}{l}(a)\\ \\ (b)\end{array}$$

Condition: (a) and (b) are disjunctively ordered.

Rule (23) is clearly not a natural alternation, and yet the alternation it attempts to describe is conceptually simple. Its simplicity is obscured by the use of binary features.[6]

7. Conclusion

While it is obvious that binary feature systems for tone have permitted many important insights into tonal phonology, it is equally clear that a universal set of features must also include some formal devices to account for the phenomena found in Igede and Mixtecan. The data presented indicate three problems with binary feature systems for tone. In Igede the tones are clearly related to each other in a hierarchical fashion, illustrated schematically in (12) above. While it is certainly possible to describe hierarchical relationships with binary features, no tonal feature system adequate for a large number of languages is capable of doing so. The addition of raising or depressing features, which would be essentially diacritic in nature, would increase the number of possible distinctive tone levels for a language well beyond the five levels attested in natural language. At the same time, it is not clear that Igede requires a scalar, multivalued description. The behavior of the tones seems to be more hierarchical than scalar.

The Mixtecan tone correspondences involve a second problem of tone splitting. The conditioning factor for the split of Proto-Trique high tone into a raised high and the original high was the loss of a final glottal stop. Tone raising as a reflex of an earlier glottal stop is attested elsewhere in natural language (Maran 1972), but loss of the glottal stop in Trique results in tone raising only with high tone. Other tones may remain unchanged or even be lowered (Longacre (1957:83)), so one would hesitate to posit a phonological feature which described a raised variant of any tone. Not only would such a feature make incorrect predictions about Trique, but it would also predict tonal systems of up to ten levels, to say nothing of the sorts of phonological classes it would define. Present binary feature systems are inadequate to handle the raising of Trique high tone, and it is even not clear whether this change should be considered a split which produces a hierarchical relationship between tones, as in Igede, or whether it should be treated as scalar.

The third type of problem is the sandhi reflexes of the Proto-Trique $-V^3$ suffix. The phonological alternations illustrated in

(21)-(23) can only be considered scalar and so cannot be described by binary features in any natural way.

It is evident that some tonal systems in natural language behave in ways which are predicted by intersecting binary features. Others, such as in Igede, require strictly hierarchical binary features and cannot be described adequately with intersecting features. Still others, illustrated by Trique, require scalar features for at least some alternations. These facts present the phonologist with a serious question. Is it ultimately necessary to have non-unique phonetic theories such that a given language will be described in part by one theory and in part by another? If the answer to this question is even partially positive, the task of the linguist, to define the class of natural languages, becomes considerably more difficult.

Footnotes

*This paper is slightly revised from the version read at the conference.

[1] Obviously further criteria must be used to limit the class of phonetic theories, but I will not be addressing such questions as the acquisition or perception of language in this paper. The two criteria given are necessary, but not sufficient, to define a possible theory of natural language phonetics.

[2] I am excluding the system proposed by Gruber (1964), which describes only four levels. Gruber's system has not been tested sufficiently to determine what its properties are. For some discussion, see Fromkin (1972).

[3] I will not discuss the question of what the articulatory correlates of Wang's features might be.

[4] George (1970:119-120) gives very few examples of this and does not formulate a rule. (4ii) would probably need revision in the face of more data, but the revision would be in the environment.

[5] Bergman (1971:18) regards object pronouns as affixal.

[6] To complete (23) one would also have to allow for some pitch 5 to alternate with 5-3, and one would have to block a 2-2-3 alternation, since this is not attested.

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.99-105 (1975)

Nonsegmental Tone in Lango*

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1. Introduction

It has been claimed that there exist morphemes consisting only of a nonsegmental, or floating tone,[1] that is, a tone which can be involved in various tone processes but which never has any surface manifestation itself. In this paper certain tone processes in Lango, a 'Nilotic' language of northern Uganda, which were first discussed in Maddieson, Shopen and Okello (1973) will be reexamined. In this reexamination of these processes special attention will be paid to certain examples which were apparently overlooked by Maddieson, Shopen and Okello (hereafter MSO), and which seem to indicate that not only do certain morphemes exist which consist only of a nonsegmental tone, but there are also rules which create nonsegmental tones, as well as rules which apparently refer only to nonsegmental tones. In conclusion, several other areas where the concept of nonsegmental tone might be useful will be discussed.

2. A Problematic case for MSO

In this section, two tone rules proposed by MSO for Lango will be examined, and it will be shown that these rules do not account for a particular set of forms. The first rule, Tone Shift (TS) can be given as follows:[2] (´ = high tone, ` = low tone, ^ = falling tone)

Tone Shift

$$\acute{V}\ (C)\ \#\ (\grave{V})\ (C)\ \grave{V} \Longrightarrow \acute{V}\ (C)\ \#\ (\hat{V})\ (C)\ \hat{V}$$

This rule is proposed to account for the following forms:

(1) a. dùl òpàt (group of strangers)
b. cál ópât (picture of strangers)
(2) a. dùl rɛ̀c (group of fish)
b. cál rɛ̂c (picture of fish)
(3) a. dùl kònò (group of feathers)
b. cál kónò (picture of feathers)

The longest expansion of the rule, in which the initial segment is a vowel, accounts for the alternation seen in the tone pattern of opat in (1), while the shorter expansion accounts for the alternation seen in the tone pattern of rɛc in (2) and of kono in

(3). In addition, a rule simplifying falls to highs when not in a monosyllabic word or before another fall can be seen to operate in (3b).

The other rule which will be examined here is Tone Copy (TC), which can be formulated as follows:

Tone Copy

[αRaised] → [-αRaised] / C [-αRaised] (C) __ # [+segmental]

This rule is proposed to account for the following forms:

(4) a. rìŋɔ́ (meat)
b. rìŋɔ̀ rómmí (meat of sheep)
c. rìŋɔ̀ kɔ́nɔ̀ (meat for feathers)

TC causes the final high of rìŋɔ́ in (4a) to become a low in (4b) and (4c) since it is followed by another word. Furthermore, as can be seen in (4c), TS must apply before TC (that is, in a counter-bleeding order) so as to cause the initial low in kɔ̀nɔ̀ to become a high.

Up to this point, the analysis proposed by MSO seems to account for tonal alternations. However, MSO fails to notice certain forms for which their analysis generates incorrect forms. Such an example is (5).

(5) rìŋɔ̀pât / *rìŋɔ́pât (meat of strangers)

There is one other rule which we must refer to in this example, Vowel Coalescence (VC), which takes a V+V sequence where the first vowel is i, u, or o (or ɩ, ʊ, or ɔ) and reduces it to a single consonant with the tenseness of the first vowel and the place of articulation of the second. TS must have applied in (5) to account for the falling tone on the ɑ; the question, then, is why the ɔ has a low tone instead of a high tone. One possible answer would be that VC has something to do with it, however, (6) shows that this is not the case:

(6) a. ɔ̀t àwóbí (house for a boy)
b. cál âwóbí (picture of a boy)
c. rìŋáwóbí (meat of a boy)

Once again, TS accounts for the tone alternations in (6a) and (6b). In (6c), then, we must assume that TS applies before VC causing the a to surface with a high tone. Thus, only (5) remains anomalous in that the initial low in the second word is "skipped" by TS.

3. Tone processes and nonsegmental tone in Lango

In §2 a form was discussed which is problematic for the analysis proposed by MSO in that TS seemed to "skip" the initial low tone vowel in certain instances. In this section it will be shown that such "skipping" of an initial low tone vowel when it is followed by a low tone vowel can also be found when the high tone meeting the structural description of TS is a nonsegmental high tone morpheme.

Nonsegmental tone morphemes must be proposed in at least two places in Lango. The first is for a certain class of possessive constructions. Most possessive constructions are regular in that they obey the rules discussed thus far. This is shown in (7) and (8):

(7) a. ŋèc gɔ́ɔ́r (the squirrels' backs)
    b. dɔ́g gɔ́ɔ́r (the squirrels' mouths)
(8) a. ŋèc dòk (the cows' backs)
    b. dɔ́g dôk (the cows' mouths)

The only alternation in tone pattern is in dok in (8), and this can be easily accounted for by TS. However, there is a small class of nouns which do pattern as expected when used as the first member in a construction showing inalienable possession. This can be seen in (9) and (10).

(9) a. tyɛ̀n gɔ́ɔ́r (the squirrels' legs)
    b. yíb ꜜgɔ́ɔ́r (the squirrels' tails)
(10) a. tyɛ̀n dôk (the cows' legs)
    b. yíb dòk (the cows' tails)

In (9b), gɔɔr is downstepped even though it is not preceded by a low tone on the surface; in (10a), dok has a falling tone even though there is no high to trigger TS; in (10b), dok has a low tone even though it is preceded by a high tone and therefore should trigger TS. These unexpected results cannot be due to gɔɔr and dok, as is shown by (7) and (8); therefore it must be due to tyɛn and yib. The most obvious solution to this problem is to claim that nouns in the class which contains tyɛn and yib require a morpheme in possessive constructions which consists of a polar nonsegmental tone. Thus, the underlying structures for (9) and (10) are given in (11) and (12), respectively.

(11) a. /tyɛ̀n ´ gɔ́ɔ́r/
    b. /yíb ` gɔ́ɔ́r/
(12) a. /tyɛ̀n ´ dòk/
    b. /yíb ` dòk/

Given these underlying representations, the correct surface representations will be predicted by the rules discussed above.

When this class of nouns which requires polar nonsegmental tone morphemes in the possessive constructions is used with words like opɑt, the following results are obtained:

(13) a. yíb òpɑ̂t (the strangers' tails)
    b. tyɛ̀n òpɑ̂t / *tyɛ̀n ópɑ̂t (the strangers' legs)

The form in (13a) is what we expect in that the nonsegmental low tone demanded by yib "protects" opɑt from the effects of TS. However, (13b) is unexpected in that although the ɑ in opɑt is a fall, apparently by TS, the o remains low, it is "skipped" by TS.

The other place a nonsegmental tone morpheme is needed is in relative clause constructions. The differences between a simple sentence and a relative clause can be seen from the examples in (14).

(14)	Simple Sentence	Relative Clause
a.	ɲálló́wɔ́rɔ̀ (Pythons went)	ɲálló́wɔ́rɔ̀ (pythons which went)
b.	kís ɔ́wɔ́rɔ̀ (Bees went)	kíc ɔ́wɔ́rɔ (bees which went)
c.	rùdɔ̀wɔ̀rɔ̀ (Twins went)	rùdɔ̀wɔ́rɔ̀ (twins which went)
d.	dɔ̀x ɔ̀wɔ̀rɔ̀ (Cows went)	dɔ̀k ɔ̀wɔ́rɔ̀ (cows which went)

There are two differences between the two constructions. First, as can be seen in (14b) and (14d), voiceless stops become fricatives intervocalically in simple sentences but not in relative clauses.[5] Second, the tone pattern is different in (14c) and (14d), where the noun is low tone. The tone pattern in the simple sentences is what is expected, with oworo remaining entirely low tone. However, in the relative clauses, the middle o is suddenly high. The most obvious way to account for this is to postulate a high tone nonsegmental tone morpheme marking relative clauses which triggers TS. However, if this solution is accepted, once again TS "skips" an initial low tone vowel when it is followed by a low tone.

4. Tone copy revisited

In §3 it was shown that the phenomenon discussed in §2 where TS seemed to "skip" an initial low vowel when it was followed by a low is not an isolated case in that this "skipping" is generally the case when the high tone meeting the structural description of TS is a nonsegmental tone morpheme. If this is indeed the case, it suggests that TC does not simply change a high tone into a low tone as MSO suggest, but rather that it moves the high tone onto a nonsegmental matrix, leaving the original vowel with a low tone. In addition, the other tone rules will have to be formulated in such a way as to insure that a nonsegmental high tone will not affect the first vowel in a word like opɑt. One way this could be done would be by permuting the nonsegmental high tone and the initial low tone before applying TS, thus bleeding TS. Given this analysis, we would obtain the following derivation for rîŋɔ̀pɑ̂t.

(15)	/rìŋɔ́ òpàt/
TC (revised)	rìŋɔ̀ ´ òpàt
Metathesis	rìŋɔ̀ ò´pàt
TS	---
Fall Creation[6]	rìŋɔ̀ ò´pât
VC	rìŋɔ̀ ´pât
	[rìŋɔ̀pât]

5. Possible further applications of nonsegmental tone

If the analysis presented here is correct, nonsegmental tones not only occur as underlying morphemes, but also can be created by phonological rules. In addition, some rules make reference to nonsegmental tones to the exclusion of segmental tones. In this last section, I would like to suggest two other areas in which a further extension of nonsegmental tones might be useful.

First, as has been shown by Peters (1973), the analysis of downstep and downdrift presented by Fromkin (1972) fails because it cannot assign the correct pitch value to a low tone following a downdrifted high tone. Peters points out that the analysis could be saved if a low tone which was later deleted were postulated before each lexically downstepped high tone, but like Fromkin, rejects this analysis on the basis that it would violate Kiparsky's constraint against "absolute neutralization". However, if instead of low tones which were later deleted, nonsegmental low tones were used, the constraint against absolute neutralization would have the same force it has in the case of boundaries--apparently none. That is, no one has used the constraint against absolute neutralization as an argument against the use of boundaries to trigger phonological rules, apparently because there is no need to have a rule deleting boundaries--it is merely part of the definition of [-segment] (a feature shared by boundaries and nonsegmental tones) that they have no direct surface manifestation. Thus, the use of nonsegmental low tones would make this objection to Fromkin's analysis void.

Second, it has been proposed by Koutsoudas, Sanders, and Noll (henceforth KSN) (1974) that rules apply whenever their structural descriptions are met unless such application is precluded by some universal principle. There is an apparent counterexample to this hypothesis in Lango which can be accounted for within the KSN framework if we claim that rules which delete vowels leave behind the tone on a non-segmental matrix. This apparent counterexample involves the apparent counterfeeding order between Fall Creation (FC) and Fall Simplification (FS). For example, the derivation of cál kónò (example (3b) above) would proceed as follows:

(16)	/cál kònò/
TS	cál kônò
FS	cál kónò
	[cál kónò]

However, at this point, FC should be able to apply, yielding *_cál_ _kónô_. It appears as though FC must be extrinsically ordered before FS so as to counterfeed it. However, if FS were to simply change the low part of the fall into a nonsegmental matrix, the low tone would intrinsically order the rules since it would prevent FC from affecting the final _o_ of _kono_.

In conclusion, I have attempted to demonstrate that the phenomena of nonsegmental tone is more extensive than is generally recognized in that it can be created and referred to by phonological rules. In addition, I have presented two other areas where the concept of nonsegmental tones may be useful.

Footnotes

*I would like to thank Tim Shopen for getting me started in looking at most of the phenomena discussed in this paper, to Ashley Hastings for discussions over some of this paper, and especially to Jenny Okello, who, as an excellent informant and linguist really gave of her time to help with this paper. Needless to say, all errors are mine entirely.

[1] By nonsegmental tone, I mean a matrix marked [-segment, ±high]. I am using this term as a synonym for the perhaps more common "floating" tone as the term "nonsegmental" seems to more adequately capture the formal characteristics of such matrices. It is important that this use of nonsegmental tone is not confused with that of Fromkin (1972). In Fromkin's use, it is used for contour tones and thus has a surface representation. It seems to me to be better to save the feature [-segment] to refer to matrices with no direct physical manifestations (like boundaries) and handle contour tones as they are handled by Maddieson (1970), that is, as [-syllabic] segments following a [+syllabic] segment.

[2] I believe this rule to be incorrect for the following reason. MSO have to postulate in addition to this rule a rule which causes a low tone to become a fall when it is preceded in the same word by a high tone. Thus, two separate rules, Fall Creation and TS, create falls. This duplicity could be eliminated if there was one rule which caused a low to become a fall if it followed a high either in the same word or across a word boundary. In addition to this generalized Fall Creation rule, we would need a rule which made a low tone initial vowel into a high tone vowel if preceded by a high tone. This rule would then feed Fall Creation. However, as the analysis presented in this paper would not change given this formulation of the rules, I will accept for purposes of argumentation the formulation of the rules presented by MSO.

[3] The feature [±Raised] is proposed by Maddieson (1970) in place of the more common [±High].

[4] That this unexpected patterning is only found in constructions denoting inalienable possession is shown by the following examples:

(i) a. tyɛ̀n gɔ́ɔ́r (legs for the squirrels)
b. yíb gɔ́ɔ́r (tails for the squirrels)
(ii) a. tyɛ̀n dòk (legs for the cows)
b. yíb dôk (tails for the cows)

[5] The forms for "bees" and "cows" appear with the voiceless stop in isolation and before a consonant in addition to in the relative clauses.

[6] This rule of Fall Creation is independently needed and motivated by MSO and is discussed in footnote 1 above.

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Proceedings of the Sixth Conference on
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Is Hausa a Suprasegmental Language?*

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1. Introduction

It has been proposed in Leben (1973a, b) that certain phenomena in Hausa require rules which depend on having tone in some morphemes represented suprasegmentally; that is, these morphemes must have separate phonological matrices for tone and for 'segmental' features (which would in Hausa be all other phonological features, presumably). This paper will present a reanalysis of these phenomena (section 2) which is based on an independently motivated type of tone assignment rule discussed in section 3. In the final section, I will discuss some implications of this reanalysis for theories of tone in general, and for Leben's theory (and John Goldsmith's similar theory—see Goldsmith (1975a, b)) of non-segmental representation in particular.

2. The Reanalysis

2.1. Leben's argument for suprasegmentally stated rules[1] in Hausa is based on the need to relate the tone pattern of the feminine form to that of the masculine form in agentive constructions and certain other forms, as illustrated in (1) (the examples are from Leben (1973a:133)).[2]

(1)
a. jínjìr+ìi (m.) jínjír+nìi+àa (f.) 'baby'
b. má+bì+ìi (m.) má+bí+ìi+àa (f.) 'follower'
c. má+àikàt+ìi (m.) má+áikát+ìi+àa (f.) 'worker'

Notice that in (1a) and (1b) the tone of the second syllable in the feminine is H, while in the masculine it is L. Moreover, in (1c) the tones of both the second and third syllables in the feminine are H while the corresponding syllables in the masculine are L. The appropriate generalization involved, Leben claims, is that the tones after the first syllable and before the -*(n)ii* suffix in the second *morpheme* are H in the feminine forms and L in the masculine forms in all three cases. He then proposes a rule of tone spreading (Leben (1973a:133)), given in (2), to derive the tone pattern on the feminine forms from that on the masculine forms.

(2) L → H/H __ L + (where '+' is a morpheme boundary)

This rule must apply to tones which are represented suprasegmentally on morphemes, since otherwise incorrect results would be derived from (1c), as shown in the derivations in (3).

(3)	Segmental Tone	Suprasegmental Tone	
	má+àikàt+ìi+àa	^{H}ma+^{L}aikat+^{L}ii+^{L}aa	Remote Form
	*má+áikàt+ìi+àa	^{H}ma+^{H}aikat+^{L}ii+^{L}aa	Rule (2)
	---	má+áikát+ìi+àa	Tone Mapping

Leben further points out that even a theory which allows rules to apply iteratively to their own output would give incorrect results since, although allowing rule (2) to apply again to the starred form in (3) would give the correct results (cf. (1c)), we would get wrong results for the masculine form since the environment for (2) would be met if tone is represented segmentally, as indicated in the derivation given in (4).

(4)		
	má+àikàt+ìi	Remote Form
	*má+áikàt+ìi	Rule (2)

Thus there seems to be a fairly strong case for suprasegmental representation of tone in such forms.

2.2. However, the assumption that the tone pattern for the feminine is derived from that for the masculine seems to me to be questionable. In fact, as I will show in the next section, there are a large number of morphologically related forms in Hausa whose tone patterns cannot be derivationally related if tone is represented either segmentally or suprasegmentally. This suggests that the same sort of thing might be going on here. Along these lines, I propose a rule of tone assignment given informally in (5).[3]

(5) (i) The tone pattern of the masculine form in the agentive construction is $H(L)_1$.

(ii) The tone pattern of the feminine in such construction is $(H)_1LL$.

(iii) The tone pattern of feminine forms which are derived by adding -aa to the corresponding masculine form, and whose 'extension' (i.e., the suffix which precedes the feminine -aa suffix) ends in a front vowel, is BLL, where 'B' for 'basic' is the tone pattern of the stem.

This rule must apply, of course, after the morphological rules which form such constructions. (5i) says essentially that ma-, the agentive prefix has a H tone and all other syllables are L, while (5ii) says that the last two syllables are L and everything else is H. (5iii) is essentially the generalization that all forms ending in surface -iyaa also end in the surface tone pattern BLH (where the final H is the result of Leben's low-tone raising rule). Other feminine forms would either be derived by Leben's (1971) non-suprasegmental rules or would be exceptions (cf. fn. 3).

2.3. One drawback to this proposal is the fact that most of Leben's rules are required here anyway; the only thing it buys you, it seems, is getting away from the need for suprasegmental tone rules. There are other advantages, however. For example, as Leben (1973a) points out, the tone of the stem is irrelevant to the tone of the agentive construction--even though the verb bii (= 'follow') has an underlying H tone, it has a L tone in the masculine agentive form, and there must presumably be some sort of morphologically conditioned tone rule to get this L there. The same sort of problem will be apparent with all non-L stems in agentive constructions. Thus, it seems that any analysis of this construction will require at least one morphologically conditioned tone rule. That is, this proposal is only extending an already required analysis when it claims that all of the tones in such constructions are morphologically assigned.

Another advantage of this proposal is that it is no longer required to posit underlying rising tones (or a suprasegmental contour that results in a rising tone), which don't occur on the surface and are otherwise not needed,[4] in order to account for the data (taken from Leben 1971) presented in (6).

(6) béebée (m.) béebìyáa (f.) 'deaf mute'
àbóokíi (m.) àbóokìyáa (f.) 'friend'

The tone on the masculine form must be lexically specified (cf. sheégèe = 'bastard'), but the feminine form does not depend on anything other than the stem (the final vowels are not part of the stem), as expressed in (5iii).

Probably the strongest argument against Leben's tone-spreading rule (and therefore in favor of my reanalysis, in the absence of any other alternatives) is its peculiar form. Note that the morpheme boundary in the structural description is not really associated in any way with the affected 'segment' (i.e., the first L). While Kiparsky (1973) has given a plausible explanation for why a morpheme boundary might be needed between the affected segment and the one that causes the change (i.e., if a rule applied morpheme internally, it would result in restructuring), I know of no reason why a morpheme boundary should be needed one 'segment' after the affected 'segment' and two 'segments' after the one that causes the change. Furthermore, I know of no other phonological rule which requires a morpheme boundary in such a position. The uniqueness and 'unreasonableness' of rule (2), then, would seem to be fairly strong reasons for rejecting it.

A final point against Leben's analysis is the fact that, as he points out in a footnote in his thesis, there must be no morpheme boundaries in word-final position, since otherwise rule (2) would apply to (1c), (underlying ^{H}ma+^{L}aikat+^{L}ii for Leben), thus producing the eventually ungrammatical *^{H}ma+^{H}aikat+^{L}ii (surface form presumably *má'áikácìi). This is contrary to the generally accepted convention for word boundaries (which are assigned to both sides of a word), and, as Leben notes, not accepted by many generative phonologists. Note that this 'convention' together with the discussion in the above paragraph, makes rule (2) look even more strange; it can apply only if there is a morpheme following the HLL sequence in question.

It seems questionable to me whether such a rule should be permitted in linguistic theory.[5]

In his thesis Leben (1973b) also claims that 'place of origin' constructions require the suprasegmental tone rule (2) to relate the feminine tone pattern to that of the masculine. He gives the pair in (7a) to support this claim (the others are from Abraham 1962).

(7) a. bà+kàtáagùm+ìi (m.) bà+kàtáagúm+ìi+àa (f.)
(cf. kàtáagùm)
b. bà+kátsín+èe (m.) bà+kátsín+ìi+àa (f.)
(cf. kàtšinà)
c. bà+gwáar+$\left\{\begin{smallmatrix}\text{íi}\\ \text{èe}\end{smallmatrix}\right\}$ (m.) bà+gwáar+ìi+àa (f.)
(cf. gwáaríi)
d. bà+núf+ée (m.) bà+núf+ìi+àa (f.)
(cf. núfée)
e. bà+dàur+íi (m.) bà+dàur+áa (f.)
(cf. dàuríi)

However, this construction seems to be amenable to the same type of treatment as the previous forms. Notice that all the feminine forms in (7) end in the tonal sequence HLL (which will come out HLH on the surface, due to Leben's 'low-tone raising', as noted above). Note further that the tone pattern for this construction seems again not to depend on the tone pattern of the place name in many cases; in fact, Abraham (1959) describes this construction as consisting of a ba- prefix and the tone pattern LHL (which I interpret as meaning L(H)$_1$L) for the masculine. These facts show, first of all, that the situation with the place of origin constructions is quite variable; neither Abraham's description nor Leben's accounts for all cases (Leben seems to imply that the masculine is formed by prefixing a L ba to the place name).

It should be pointed out that (7d) could only be accounted for (as far as I can tell) by having an 'abstract' rising tone on the ee of Nufee (cf. fn. 4); exactly the same problems as were encountered with the forms in (6) would obtain here.

However, one regularity remains--all feminine forms that end in surface -iyaa also end in the tone pattern HLH. This is also true of the forms accounted for by (5iii), although the antepenultimate H would be redundant in this case, since all the relevant stems end in H tones. This suggests that (5iii) might better be formulated as in (8), so as to include the place of the origin phenomena.

(8) The tone pattern...is BHLL.[6]

If the fact that forms like kàryáa (cf. fn. 2) are exceptional is not accidental (note that the stem ends in a L), then this would be evidence in favor of the reformulation given in (8).

2.4. In short, I have argued in this section that it is not necessary to represent Hausa tone suprasegmentally in Leben's sense.

In the next section, I will attempt to show that suprasegmental tone is not sufficient to account for other phenomena in Hausa, and that, in fact, a theory which permits the type of analysis proposed here is required.

3. Other similar phenomena

3.1. I will attempt to show here first of all that it is not possible to relate derivationally the tone patterns of certain classes of singular nouns and those of their plurals, regardless of whether tone is represented segmentally or suprasegmentally.[7] Consider the forms in (9).

(9) a. làabáarìi (sg.) làabàarái (pl.) 'news'
b. kújèeráa (sg.) kùjèerúu (pl.) 'chair'
c. kàasúwáa (sg.) kàasùwái (pl-Skoto) 'market'

It seems clear that it would be at least very difficult to relate the singular and plural tone patterns derivationally. Evidently what is needed is a morphologically conditioned rule which assigns the tone pattern $(L)_1H$ to nouns which are lexically marked for this pattern in the plural.[8]

3.2. Secondly, there seems to be no way to relate intensive verb forms to their basic forms using ordinary tone rules. Consider the data presented in (10).

(10) a. káamàa kánkàamáa 'catch'
b. hàrbáa hàhhárbàa (__#) 'shoot'
hàrbée hàhhàrbée (__Pro)
hàrbí hàhhàrbí (__N)
c. fìtá fìrfítà (one alternant) 'go out'

The intensives are formed by reduplicating the first CVC sequence, and then rules of assimilation apply to give the surface form. It should be fairly obvious that ordinary segmental tone rules can at best clumsily relate the forms in (10a) and (10c) and the pre-pausal form is (10b). Furthermore, suprasegmental representation, if made a part of the lexical representation (i.e., if tone is represented as a part of morphemes), implies wrong results, in (10b) and (10c), although interestingly (but, I think, accidentally), it does predict the correct forms in (10a). There seem to be three possibilities: first, the tone mapping rules apply before reduplication, which reduces to the same case as for segmentally represented tone; second, the suprasegmental contour is reduplicated along with the appropriate segments; third, the suprasegmental contour remains the same but has as its domain the entire reduplicated form. The latter two possibilities are illustrated in the derivations given in (11) and (12), respectively.

(11) ^{HL}kaamaa   Lexical Representation
^{HL}kam+^{HL}kaamaa   Reduplication
*kânkáamàa   Tone Mapping

(12) a. ^{HL}kaamaa   Lexical Representation
^{HL}kankaamaa   Reduplication
kánkàamàa   Tone Mapping
kànkàamáa (correct)   L-raising
b. (_#) (_Pro) (_N)
^{LH}harbaa ^{LH}harbee ^{LH}harbi   Lexical Representation[9]
^{LH}hahharbaa ^{LH}hahharbee ^{LH}hahharbi   Reduplication
*hàhhárbáa *hàhhárbée *hàhhárbí   Tone Mapping
c. ^{LH}fita   Lexical Representation
^{LH}firfita   Reduplication
*fìrfìtá   Tone Mapping

(I give only the derivation for (10a) in (11), since the other forms have exactly analogous problems.)

What seems to be the correct relationship between the tone patterns of the basic and reduplicated forms can be ascertained from a look at the Hausa 'verbal grade' system, as first proposed by Parsons (1960). There are a number of 'grades' of polysyllabic verbs in Hausa, which can be characterized by their tone patterns and final vowels. Thus káamàa is Grade 1, hàrbáa is Grade 2, etc. The interesting thing is that the tone patterns of the reduplicated forms are the same as those of other verbs in the same grade. This suggests that the tone patterns should be assigned after reduplication on the basis of the grade to which the verb in question belongs. Thus the rule assigning tone to regular verbs in Hausa would be something like (13).

(13) Assign Grade N tone patterns to Grade N verbs.

4. Conclusion

It seems clear then, that in order to account for these phenomena in Hausa, linguistic theory must allow tone not only to 'get out of step' with segments, as the proposals of Leben and Goldsmith would allow, but even to have no particular relationship to morphemes at all. That is, the tone-bearing unit in at least areas of a grammar of Hausa is the 'construction'--agentive (m.), agentive (f.), plural, Grade N verbs etc.

I will not attempt to formalize the rules proposed here; the formalisms proposed by both Leben and Goldsmith would seem to be fairly readily adaptable for such purposes. The important point is that (non-segmental) tone must be represented as a property not of morphemes (in the cases discussed here), but of entire constructions. For this to be possible, either tone must not be represented in the lexicon and is assigned by a rule which is sensitive to whether or not the morphemes in question are part of a construction which has a characteristic tone pattern, or the formalisms involved must be capable of erasing (or ignoring) the tones that are already associated with morphemes. I will not pursue the subject of a formalism forther here, although I agree (contrary to some linguists) that such matters are quite important.

It is interesting to note that Courtenay's (1974) reanalysis of tone in Bambara noun compounds would appear to necessitate the same sort of loosened framework for tonology. Another example of phenomena which seem to be suitable for this type of treatment is the Mende noun compounds phenomena discussed by Leben and by Dwyer (1973). The related Southwestern Mande languages discussed by Dwyer are very similar to Mende, and would seem to be amenable to similar treatment.

Since Courtenay has argued convincingly that Leben's suprasegmental rule for Bambara is incorrect, and since similar problems will probably crop up in Maninka (which is a dialect of Bambara), then if the analysis I gave in section 2 is accepted, we are left with no known suprasegmental tone rules. This state of affairs would seem to be that predicted by Goldsmith's theory (subject to the reservations mentioned in fn. 5)--if tone rules apply only to tones 'associated' to vowels, then suprasegmental rules of the type proposed by Leben would not be permitted. Such a restriction on tone rules is clearly desirable, since it results in a stronger (i.e., more falsifiable) theory. This would then be another point in favor of the reanalysis presented here. Note that, since rules of the type proposed here are needed elsewhere (as Leben admits), the theory is not weakened any by proposing such a rule to account for the phenomena in question.

In summary, then, the suprasegmental framework proposed in Leben (1973a, b) is neither necessary nor sufficient to account for the range of phenomena known to occur. On the other hand, one similar to that proposed in Goldsmith (1975a, b) (restricted so that all tone rules apply after the well-formedness condition, and augmented to allow for the type of rule discussed here) seems to be both necessary and sufficient to handle these phenomena.

Footnotes

*This paper has benefited from discussions with Dave Dwyer, John Eulenberg, John Goldsmith, and Will Leben. The latter deserves an extra vote of thanks, since without his previous work both on Hausa and on tone in general, I would not have been led to ask the questions which have resulted in this paper.

[1] By 'suprasegmentally stated rule' (or simply 'suprasegmental rule') I am referring to a rule which makes crucial reference to tones which are represented suprasegmentally in Leben's sense, i.e., tones which are represented on entire morphemes and have not yet been 'mapped' onto segments. Thus the rules discussed in Goldsmith (1975b) do not qualify in this technical sense as 'suprasegmental rules'. Unless this paper is viewed with this definition in mind, the point of view implied by the title (i.e.,

that there are no suprasegmental rules in Hausa) might seem self-contradictory, since I hope to show that at least some tone is (to use a neutral term) non-segmental. The question asked in the title could be rephrased as "what kind of non-segmental tone does Hausa have?"

[2] The forms given are actually rather remote representations. A number of other rules will apply to these forms to produce the correct surface forms (cf. Leben 1971 for a discussion of these rules).

[3] This analysis would require considering pairs such as *Kàrée*/*Kàryáa* (= 'dog') as exceptional, as indeed they seem to be. I would consider such pairs as *yárò o*/*yáarínyàa* (= 'boy'/'girl') and *záakìi*/*záakányàa* (= 'lion') as exceptions, with the feminine and masculine suffixes represented separately in the lexicon. This is contrary to Leben (1971), who attempts to relate them, although not very successfully, it seems to me.

[4] I find Leben's (1971) arguments that the genitive linker has an underlying rising tone unconvincing; one important claim in Leben's anlaysis--that there is independent evidence for a H on the first person possessive pronoun--seems to be incorrect in view of the discussion in Eulenberg (1973). See the above-mentioned articles for further discussion. Leben pointed out in the question period following this paper that a theory such as that proposed by Goldsmith (much of which Leben now accepts in preference to his own original proposals) would allow such forms to be generated without absolute neutralization rules. Strictly speaking, this may be true (I'm not sure what an 'autosegmental' analysis would look like), but it would seem that any proposal which attempts to relate derivationally the tone patterns in the masculine and feminine for such forms would in spirit require absolute neutralization: presumably at some stage of the derivation, there would be a rising tone on the final vowel in the masculine which would have to be simplified by rule.

[5] Another comment by Leben after this paper was that his analysis would allow morphemes to have only one type of tone (i.e., there could be no mixtures of H and L within a morpheme in the relevant constructions), while my analysis would not imply these facts. Strictly speaking, this is true; however, the necessary tone patterns in the rule corresponding to (5) would have to be quite complex if these facts did not obtain. It is possible that there is a limit to the permissable complexity of tone patterns (or at least, more complex patterns are highly marked), although I haven't investigated this possibility in any detail. Note that the tone patterns proposed here seem fairly simple intuitively.

It should also be pointed out that Goldsmith's theory (which, as noted above, Leben views quite favorably) would have as much trouble simply stating the generalization that Leben claims is involved as would a theory in which tone is represented segmentally, unless there are tone rules which apply before the tones are 'associated' with segments. Goldsmith makes no specific allowance for such rules (all the rules discussed by Goldsmith apply after this association), and they would have to be of a different formal nature than those Goldsmith discusses.

[6] There is a problem with this formulation in that the H must replace a L of the basic stem pattern (which I assume to be the same as the pattern for the masculine--there may be no direct relationship between the tone pattern on the stem in isolation, and what I am referring to as the 'basic stem pattern', as noted above) in the cases that are crucial to Leben's rule's being suprasegmental, such as (7a). It will be seen in the final section that the formalism required for these rules will probably have to be capable of replacing tones that are already on morphemes. However, all other rules replace either all of the tones of a morpheme or none of them. A rule which replaces only one of the tones of a morpheme could surely be made to work somehow (e.g., by a 'universal convention'), but I know of no really intuitively satisfying way of doing this.

A further revision might be indicated by the feminine form given in (7e). Notice first that if the normal process of forming the feminine is carried out, the entire basic tone pattern would be obliterated. Thus a restriction might be added to (8) which would disallow the normal process in such cases and force another type of feminine-formation (namely changing the final vowel to a). Such a revision would create a (look-ahead) global rule (cf. Hill 1970, Lightner 1971), which would be rejected by many generative phonologists. However, since Leben's formulation doesn't account for such forms at all, this point is not critical for choosing between the two analyses.

[7] John Eulenberg has pointed out to me that such a derivational relation may be possible if (excessively, in my view) abstract underlying representations are used. This is probably the case, since as Derwing (1973) points out, a theory with essentially no restrictions on underlying forms allows tremendous leeway in linguistic descriptions. I suspect that such representations (if they "exist") could be shown to imply incorrect predictions about new forms using methods such as those demonstrated in Churma (1974).

[8] I assume that each noun is lexically marked for its plural, since the Hausa plural system is so variable. There probably are ways of predicting subregularities in plurals, but since this issue is not crucial to this discussion, I won't pursue it further here.

[9] It is not at all clear exactly what the lexical representation should be in cases like this, given the strange morphologically conditioned variation in vowel quality. However, it seems fairly clear that the underlying tone contour for the basic forms should be LH; in any case, no tone contour could give the correct results in such cases, as far as I can tell. This phenomenon clearly has important implications for almost any theory of phonology, but I cannot examine it here, due to space limitations.

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.116-124 (1975)

The Ordering of Derivational Tone Rules in Yoruba*

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1. Introduction

Although Yoruba has a surface structure which is tonally very diversified, it is generally accepted that it has an underlying structure of only three tones which, moreover, are level. A set of rules is needed to derive this surface structure from the underlying one. By tone rule in this paper is meant any rule which plays a role in determining in part the surface tonal structure of a sentence. These rules have to be ordered carefully, as will be indicated below.

2. Two Types of Tone Rules

When discussing the ordering of derivational tone rules in Yoruba, it may be useful to distinguish two types of rules: (1) syntactic tone rules, those with a syntactic function or that are triggered by a syntactic environment, and (2) phonetic tone rules, those that have no syntactic function and are triggered by a phonetic environment. As an example of the first kind we can take the tonal changes operating under certain conditions in nouns when they function as the subject of a sentence preceding the predicate (Rule 8). As an example of the second type, we can take the tone spreading rule[1] which governs the changing of a high tone to low-high rising when following a low, and the low becoming high-low falling when following a high (Rule 11).

3. Suggested ordering[2] (to be discussed in detail below):

3.1. Syntactic Tone Rules

R1. Possessive tone junction
(before R1) (After R1) (gloss)
ọkọ mi > ọkọ̀ mi 'my husband'
ilé Báyọ̀ > ilée Báyọ̀ 'Bayọ's house'

R2. High-tone junction verbs
iyán dùn je > iyán dùnún jẹ 'pounded yam is tasty'

R3. Low-tone-junction adjectives
ọmọ kan > ọmọ̀ kan 'a child'

R4. Emphatic sentence-final tone changes
ó mà ti dé > ó mà ti déè 'he has arrived!'

R5. Low-toned verb before noun object
ó rà àlùbọ́sà > ó ra àlùbọ́sà 'he bought onions'

R6. Mid-toned subject pronoun before high-toned syllabic nasal
mo ńfẹ́ > mò ńfẹ́ 'I want'

R7. Verb-Object Pronoun tone polarization
ó ti ṣe $\overset{\emptyset}{\text{ẹ}}$ > ó ti ṣe é 'he has done it'

ó mọ̀ $\overset{\emptyset}{\text{ọ}}$ > ó mọ̀ ọ́ 'he knows it'

R8. Subject-Predicate high-tone junction
Báyọ̀ fẹ́ jáde > Báyọ̀ọ́ fẹ́ jáde 'Bayọ wants to go out'

(Non-tonal P-rules, including Vowel Assimilation Rules as in:

a ò lọ > a à lọ 'we didn't go'
ọmọ tí ẹ rí > ọmọ tẹ́ ẹ rí 'the child you saw'
ó gba owó > ó gbo owó 'he got money')

3.2. Phonetic Tone Rules

R9. Condensation and contraction (or Vowel [-segm.] introduction (V̶))

Condensation: ọmọ tẹ́ ē rí > ọmọ tẹ́¯ V̶ rí 'the child you saw'
Báyọ̀ọ́ fẹ́ jáde > BáyọV̶ fẹ́ jáde 'Bayọ wants to go out'

Contraction: ó rā àlùbọ́sà > ó rV̶̄ àlùbọ́sà 'he bought onions'
ó gbō ōwó > ó gbō V̶̄wó 'he got money'

R10. Restricted V̶-deletion rule, see examples of the operation of this rule in different dialects under 5.6 below.

R11. Spreading
bàbá > bábǎ 'father'
púpọ̀ > púpộ 'plenty'

R12. Linking into glides
ā à lọ > āà lọ 'we didn't go'

R13. Pitch assignment rules
a. Downdrift
[1] slip of low tone
ọ̀rọ̀ [_ _] > [_ _] 'word'

[2] downdrift
ọ̀rọ̀ tí mo sọ [_ _ ¯ — —] > [_ _ ¯ — —]
'the word I said'

b. Pitch adjustment rules
[3] shortening of high-low and low-high glides
when not linked to a following tone
kò wǎ [_ ⁄] > [_ ⁄] 'he didn't come'
but: kò sǐ ibití...[_ ⁄⌒‾] > (unchanged)
'there is no place...'

[4] interaction of consonants and tone
kò wǎ mi [╲ ⁄ -] > (unchanged)
'he didn't look for me'
but: kò kí mi [- ⁄ -] > [-‾-] 'he didn't greet me'
[5] interaction of R9 and R11
kó wǎ [_ ⁄] > (unchanged)
'he didn't come'
but: kò wǎlé [- ⁄ ‾] > [_ – –]
'he didn't come home'

[6] tonal assimilation
àléjò [_ ⁄ ╲] > [_ – _] 'guest'

[7] second high following low going back to sentence-initial high pitch in final position
kò kí mi mọ́ [_ – _ –] > [_ – _ ‾] 'he doesn't greet me anymore'

[8] two successive low before final high leveling out
ìyàwó [– _ ⁄] > [_ _ ⁄] 'wife'

[9] sentence-final pitch lowering
ó fẹ́ rí ọ# [– – – _] > [– – – _] 'he wants to see you'

[10] reflection of moods of speaker
kò mọ̀ [_ _] > [– –] 'he didn't know! (indignation)

....

R14. V-deletion rule, see 5.6 below.

4. Syntactic Tone Rules: Doubts About their Status

The overall ordering of syntactic tone rules before phonetic tone rules is an obvious procedure and probably a language universal. To motivate it, it will be sufficient to point out that tone rules which are related to syntactic processes necessarily operate on a deeper level than rules which are strictly phonetic and therefore low level. E.g. the purpose of R7 is to assign a tone to the object pronouns. This has to be done before the application of R11 affecting high following low, which applies to certain object pronouns. Therefore syntactic rules have to be ordered before phonetic ones. However, it seems that the syntactic tone rules do not have to be ordered relative to each other. Each rule concerns items which, at this point, have no tonal relations.

4.1. A special problem concerning syntactic tone rules is that of cases where a tone is added to an existing structure, sometimes involving the insertion of an extra vowel which is retained into the surface structure. An example is the subject-predicate high-tone junction rule mentioned above (R8). It has increasingly become more accepted that the origin of this high-tone junction is a high-tone subject marker which is underlyingly present in the predicate, and which subsequently assimilates in vowel quality (not tone) to the preceding noun (see Courtenay (1968:70); Fresco (1970:65); Stahlke (1974:173)). In this case we no longer have to treat this high-tone-junction as a tonal phenomenon, but rather as a mere case of vowel assimilation which will be subjected to the condensation, contraction and spreading rules when reaching the phonetic tone rules. The same analysis could be applied to the high-tone-junction verbs (R2), although the nature of the assimilated element is disputed (see Awobuluyi (1970) and Bamgboṣe (1971)). The same is true for the possessive tone junction (R1) where the assimilated segment is probably 'ti', with a low tone for the 1st and 2nd person singular, and a mid tone for the other pronouns and for some noun-to-noun possessive relationships. In the case of the low-tone-junction adjectives (R3) the assimilation process is even clearer because both the assimilated and the unassimilated forms occur synchronically in the language.

A slightly different case is that of the emphatic sentence-final tone changes (R4) which is a case of tone polarization (Bamgboṣe (1966b:45)). There we have to assume the addition of an emphatic marker (a vowel, maybe 'o') to the sentence marked for emphasis. But here a tone rule is needed because the emphatic marker has no constant tone. Its tone is determined by its environment.

Rules which don't require vowel insertion are: the verb-object pronoun tone rule (R7) which assigns tones to object pronouns which polarize with the lexical tone of the verb they accompany; the rule which changes the mid tone of a pronoun to low before a high-toned syllabic nasal (R6); and the rule which changes the low tone of monosyllabic verbs to mid before a noun object (R5).

4.2. Following these considerations, a more radical view of the set of tone rules in Yoruba could be to retain only a set of phonetic tone rules, to which the assigning of a tone to the object pronouns, to the emphatic marker and to the mid-toned pronouns before a high-toned syllabic nasal would be added as mere phonetic processes of polarization. These three rules would have to be ordered before the other phonetic tone rules, however, because of their close relation to syntactic processes, and because they provide input for the other phonetic rules. We would have excluded from the tone rules, therefore, all the so-called syntactic tone rules which require a vowel insertion prior to the assignment of a new tone to the construction. The only remaining syntactic rule is R5 (a low-toned verb becoming mid before a noun object) which apparently has neither a phonetic function, nor does it require the insertion of a vowel. This rule would, therefore, have to be assigned the status of the only syntactic tone rule in Yoruba. This would be a doubtful situation, however, which would invite further research and the possible eventual inclusion of this rule with the vowel insertion type, which would exclude it from the tone rules. This would leave us with a greatly reduced set of tone rules, all phonetic:

1. Verb-Object Pronoun tone polarization
2. Emphatic sentence-final tone changes
3. Mid-toned subject pronoun before high-toned syllabic nasal
4. Condensation/Contraction rule
5. Restricted V̶-deletion rule
6. Spreading
7. Linking into glides
8. Pitch assignment rules
9. V̶-deletion rule

Non-tonal P-rules are ordered before this set. To avoid confusion, in the remainder of this paper we will still refer to the rule numbering given earlier.

5. Phonetic Tone rules

The ordering of the phonetic tone rules is intricate and controversial. The main problems arise from the interaction of non-tonal P-rules and tonal P-rules. As an illustration of the difficulties we list here the set of ordered rules given by Courtenay (1968:50). The application of her rules to all the possible cases of high with non-high tonal contractions point to the problems that exist: ('terracing' is downdrift, 'glide' is spreading)

Underlying	lí ọkọ	lí ọkọ́	lí ọkọ̀	lí ọ̀kọ̀	lí ọ̀la	lí àná
After P-r.	lọ́kọ	lọ́kọ́	lọ́kọ̀	lọ́ Ø̀kọ̀	lọ́ Ø̀la	lá Ø̀ná
Terracing	-	-	-	-	lọ́ Ø̀'la	lá Ø̀'ná
Ø-deletion	-	-	-	lọ́kọ̀	lọ́'la	lá'ná
glide rule	-	-	lọ́kộ	lọ́kộ	-	-
derived	lọ́kọ	lọ́kọ́	lọ́kộ	lọ́kộ	lọ́'la	*lá'ná

The ordering suggested in this paper, which will be exemplified with the same data below, has the following characteristics:

5.1. The non-tonal P-rules include vowel assimilation rules. The output of these rules are vowel pairs consisting of two vowels that are identical as to their non-tonal features. Some of these vowel pairs will later in R9 be subjected either to condensation, which means that one of them will become non-segmental while the other will carry the tonal features of both, or to contraction, which means that one of the vowels becomes non-segmental while keeping its tonal features. Later, R10 and R14 will delete the non-segmental vowels originating from both condensation and contraction.

This approach means that instead of three groups of P-rules, i.e. (1) vowel assimilation rules (the first of which commonly reads: the vowel [i] assimilates in quality to a neighboring vowel), (2) vowel contraction rules (the first of which--again--usually reads: the vowel [i] is deleted in a contraction with another vowel), and (3) tonal condensation/contraction rules, we now only have two: (1) vowel assimilation rules which are non-tonal P-rules and which establish pairs of identical vowels, and (2) condensation/contraction rules which operate on these pairs and are governed by tonal rules. It is of course the assimilation rules which will carry the burden of determining the quality of the vowel which will be kept after the contraction rules have operated since the latter only operate between vowels that have the same non-tonal features. As can be seen already from the rules concerning the vowel [i] above which have now been collapsed in the assimilation rules, this procedure is more economical.[3]

The rules concerning the choice of the vowel and its tone which is to become non-segmental in contraction (and therefore to be deleted) are general and without apparent exceptions. These rules will be similar, of course, to the rules which governed the behavior of tones in vowel contraction as described traditionally. E.g. traditionally, a rule would state that in a contraction between a high tone and a mid tone, the mid tone will be deleted. We now say that the vowel carrying the mid tone becomes non-segmental.

5.2. After the condensation/contraction rule, there is a rule (R10) concerning the deletion of ¥ in certain environments. This rule is general in some Yoruba dialects (all ¥ deleted before low-toned vowel, as e.g. in the dialect Courtenay was dealing with), it is selectively applied in others (Bamgboṣe's dialect, see Bamgboṣe (1966a), where the restriction is that ¥ is deleted before low-toned vowels only if itself has a non-low tone), and not applied elsewhere. All outputs have been recorded and are included in the examples given under 5.6. below.

5.3. High-low and low-high glides are introduced through the spreading rule (R11), while all other glides originate through the linking rule (R12) which governs the mere linking up, or slurring, in vowel quality and tone of all contiguous vowels. It would be possible to introduce all glides through the linking rule, and in order to account for the fact that spreading occurs across consonant boundaries, to analyze it as Fresco does[4] by prefixing to the second vowel an extra vowel of the same quality but with the tone of the previous vowel. Linking would later provide the glide, and another rule reducing the length of the glide would give the correct surface output. However, since we may have opted above (4.2.) not to use vowel insertion rules in order to account for tonal changes, it seems better to keep spreading as an independent glide introduction rule. This implies that we are assigning to the low-high and the high-low glides a different status from the other glides in Yoruba.

5.4. The set of rules under R13 can be grouped together. They are the rules that assign phonetic pitches to the vowels bearing the tones.

5.4.1. The slip rule and downdrift rule must be viewed as one process. By slip rule is meant that all low tones end on a slightly lower pitch level than the one they started on, while mid and high tones are always level. This way of analyzing the low tone has already been suggested by J. Stewart (1971:185) and was further described by Hombert during this conference. Downdrift is then a quasi-automatic process if we assume a fixed L-H and L-M pitch interval, since the reference point for the H's and the M's (the preceding L) has been lowered.

5.4.2. The remaining pitch assignment rules could be called pitch adjustment rules, because they operate on the rigorous tonal framework that has been set up so far, by introducing certain low level adjustments in the pitches that have been assigned. The pitch adjustment rules are only roughly ordered here, and the set is certainly incomplete. More detailed research, including the study of dialectal variations and speech tempo, has to be done in this area of tonal phonetics.

5.5. Finally we have the usual clean-up rules where, among other things, the non-segmental vowels, with or without tones, are deleted (R14).

5.6. We can now study the effects of the application of the rule ordering suggested here on the examples used above under 5. The scope of R10 is different for different dialects (see 5.2. above), so we have different sets of data for rules 10-14. Linking (R12) and pitch adjustments of R13 have not been represented.

Underl.	lí ọkọ	lí ọkọ́	lí ọkọ̀	lí ọ̀kọ̀	lí ọ̀la	lí àná
Assim.	lọ́ ọkọ	lọ́ ọkọ́	lọ́ ọkọ̀	lọ́ ọ̀kọ̀	lọ́ ọ̀la	lá àná
R9 contr.	lọ́ Vkọ	lọ́ Vkọ́	lọ́ Vkọ̀	lọ́ V̀kọ̀	lọ́ V̀la	lá V̀ná

a. Courtenay

R10	-	-	lọ́kọ̀	lọ́kọ̀	-	-
R11	-	-	lọ́kộ	lọ́kộ	-	lá V̀nǎ
R13	-	-	-	-	lọ́ V̀'la	lá V̀'nǎ
R14	lọ́kọ	lọ́kọ́	lọ́kộ	lọ́kộ	lọ́'la	lá'nǎ

b. Bamgboṣe

R10	-	-	lọ́kọ̀	-	-	-
R11	-	-	lọ́kộ	-	-	lá V̀nǎ
R13	-	-	-	lọ́ V̀'kọ̀	lọ́ V̀'la	lá V̀'nǎ
R14	lọ́kọ	lọ́kọ́	lọ́kộ	lọ́'kọ̀	lọ́'la	lá'nǎ

c. Other

R10	(not applied)					
R11	-	-	-	-	-	lá V̸̀nǎ
R13	-	-	-	lọ́ V̸̀'kọ̀	lọ́ V̸̀'la	lá V̸̀'nǎ
R14	lọ́kọ	lọ́kọ́	lọ́kọ̀	lọ́'kọ̀[5]	lọ́'la	lá'nǎ

Glosses:
'to have a husband, hoe, truck, spear' 'tomorrow' 'yesterday'

6. Conclusion

In this paper an attempt was made--maybe for the first time--to account for all existing tone rules of Ycruba and to categorize them. Without going into the mechanics of each rule, the paper then tried to set up a motivated basis for the ordering of these rules, leaving only one well delimited area vague (the pitch adjustment rules). The measure of the paper's validity depends, therefore, on the completeness of the listing and the validity of the established categories, as well as on the rule ordering itself.

Footnotes

*I am indebted for comments on earlier drafts of this paper to P. Bennett, I. Dihoff and A. Bolstad. During the conference, helpful suggestions were made by A. Bamgboṣe and W. Welmers.

[1] Terminology suggested by L. Hyman (1973 and personal communication).

[2] The symbols used in this paper are the following:

[´]: high tone
[`]: low tone
[ ] or [¯]: mid tone
[ˆ]: high-low glide
[ˇ]: low-high glide
[$\overset{\emptyset}{V}$]: vowel with no assigned tone

['] : the following tone is subjected to downdrift
[V̸]: Vowel [-segmental]
[ẹ], [ọ] and [ṣ]: [ɛ], [ɔ] and [ʃ] respectively.
[Vn]: a nasalized vowel

[3] Vowel contraction and assimilation in Yoruba has been abundantly treated elsewhere, see e.g. Bamgboṣe (1965); Courtenay (1968:55f.); Oyelaran (1971:165f.).

[4] Discussed by Courtenay (1968:92).

[5] The output of R14 here suggests the existence of a surface tonal distinctiveness between an ordinary slipped L after H (lọ́kọ̀) and a slipped L with downdrift (lọ́'kọ̀). From data recorded, however, I think we are here in an undefinable area of idiolectical changes and free variation.

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.125-134 (1975)

Downdrift and Downstep in Luo

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1. Scope

Luo is a Nilotic language spoken principally in Western Kenya. It combines a rich and complex tonal system with an equally rich and complex intonational system. In this paper we can do no more than give bare mention to those aspects of tone, stress and intonation which are not relevant to downstep and downdrift. For a full analysis of Luo phonology and tonology the reader is referred to Tucker (forthcoming). The terminology presented here is also due to Tucker and is discussed in greater detail in Tucker (forthcoming).

In this paper we discuss in detail a new type of downdrift which operates in Luo along with other well-known tonal and intonational processes. Our auditory analysis has been supplemented by two kinds of instrumental data: tonometer readings (University of London) and pitchmeter readings (University of Toronto). As the former are presented in Tucker (forthcoming) we utilize here only the pitchmeter readings. Over four hundred words, phrases and sentences form the corpus for our report here, but the corpus is open-ended in that we are continually adding to it. On the basis of the instrumental evidence we will suggest an analysis of the interrelationships of the various phenomena comprised under the headings of downstep and downdrift.[1]

2. Definitions and notational conventions

In Tucker and Mpaayei (1955:170) downdrift was defined as "the gradual sinking of the voice as the sentence proceeds." An explanation of this definition immediately followed and characterized the context in which downdrift occurs in Maasai: "A safe rule to follow is: when a low tone occurs after a high tone, all subsequent high tones will be in a lower key." Downstep was characterized in the following way: "Normally two or more consecutive high tones have the same pitch... There are occasions, however, when a high tone, even when immediately following another high tone, is depressed, and may be said to 'step down' to mid" (1955:172).

In the present paper we wish to revise these definitions slightly in order to make provision for the new type of downdrift found in Luo. The kind of downdrift found in Maasai will be called explicit downstep. Further types of downstep and downdrift are characterized below (sections 5 and 6).

A modified form of the Westermann system is used for tone-marking (a stands for any vowel): á (high), a̍ (downstep), â (high falling), a (i.e., unmarked, low), ǎ (rising), à (low falling).

Stressed syllables (usually stem syllables) are pronounced with lengthening unless CV in word final position. This lengthening is indicated in transcription with a raised dot. Normally stress is greatly reduced in non-terminal position in an intonation group.

Pitchmeter readings are given in Herz (rounded to the nearest Hz). Initial voiced consonants have a pronounced depressing effect on pitch, and such pitch readings are distinguished by giving the appropriate consonant symbol in brackets following the pitch number. A discussion of the pitch perturbations caused by adjacent consonants is given in Léon and Martin (1972).[2]

3. A brief comparative overview

In many East African languages which we have studied, sequences of continuous high tones are of constant pitch. It would also appear (Schachter 1969) that many West African languages are of similar type. We give examples for Maasai and Nandi-Kipsigis:

(1)	Maasai	embúlótó	'piercing'
(2)	Kipsigis	ké·cí·rék	'sheep'
(3)	Nandi	áwé·ndí·	'I'm going'

In Nandi, low tone sequences are also of constant pitch:

(4)	Nandi	ka·ro·n	'morning'
(5)	Nandi	lagat	'evening'

In Kipsigis in a series of low tones (which conclude an utterance or constitute an utterance), the final low tone is lowered slightly:

(6)	Kipsigis	laŋat	'evening'

In Luo in a series of contiguous tones of the same type (high or low), pitch falls steadily throughout the utterance:

(7)	Luo	sígá·ná	'story'
(8)	Luo	rawɛ·ra	'boy'
(9)	Luo	pá·lá	'ochre'
(10)	Luo	pa·la	'knife'
(11)	Luo	mǫ́·n	'women'

It is towards a specification of the nature and scope of this phenomenon in Luo that our paper is directed.

4. Tonal processes

(The following discussion is of necessity highly incomplete.)

4.1. High tone spreading (this term is from Hyman and Schuh 1973). A high tone raises a following low tone:

(12) rɨ·ŋó 'meat' + bɛ·r 'good' rɨŋó bɛ́·r 'meat is good'

4.2. Rising tone simplification. A rising tone becomes a low tone before a following syllable which is itself raised if it is low:

(13) ɔ̌·k 'not' + aŋȩ̂·yo 'I know' ɔk áŋȩ̂·yo 'I don't know'
(14) sǎ 'watch' + mábɛ́·r 'which is good' sa mábɛ́·r 'watch which is good'

As a rising tone is readily analysed as a sequence of L + H, rising tone simplification is simply a case of high tone spreading.

4.3. Falling tone simplification. Basically a falling tone on a non-stressed (short) vowel commutes to a high tone, but there are three distinct subprocesses:

I. A falling tone plus a high or high falling tone commutes to a high tone plus a downstep (implicit downstep):

(15) ɲá·kɔ̂ 'girl' + mɔ́·rɔ̂ 'some' ɲákɔ́ mɔ̍́·rɔ̂ 'some girl'

II. A falling tone which is preceded by a high tone commutes to a high tone, and a following low tone is heard as a low falling tone. Monosyllabic CV stems must be analysed as CV́^ (H + F) although they are phonetically CV̂ (H + L):

(16) lȩ̂ 'animal' + bɛ·r 'good' lȩ́ bɛ́·r 'the animal is good'
(17) ɲá·kɔ̂ 'girl' + bɛ·r 'good' ɲákɔ́ bɛ́·r 'the girl is good'

III. Elsewhere a falling tone followed by a low tone commutes to a high tone without altering the following low:

(18) rawȩ·rȩ̂ 'boys' + bɛ·yo 'good' rawȩrȩ́ bɛ·yo 'the boys are good'

5. Downstep

5.1. Explicit downstep. A low following a high tone results in a change of 'key' with the new 'key' being lower than the former 'key'. All subsequent high or falling tones will be in this lower key. A high falling tone also results in a new key for following tones and hence may be analysed as a sequence of High + Low.

(19) gí nɩ kɛ́θɔ̂ mɔ̍́·n,... 'this thing affects women,...'
166 128 142 103-117

This example also contains an instance of implicit downstep: kɛ́θɔ̂ mꜜʋ·n.

(20) mɔ́n ɓwɩtɔ náŋgá mɔ́rɔ̂ ɔ·- kɔ̂
155 128 133 135 128-105 110-108 'the women have thrown the other cloth away'

5.2. Implicit downstep. As noted above (4.3) the commutation of a falling tone in non-final position to a high tone also entails the lowering of a following high or falling tone. Note that the degree of lowering is exactly the same as when an intervening low is present (explicit downstep). Evidently explicit and implicit downstep may be considered to be the same process from a phonetic point of view.

(21) ɹl lʊ̂ɔ́ŋgɔ̂ mꜜɔ́·n
122 136-51 129-112 'the people are calling the women' (lʊ̂ɔ́·ŋgɔ̂ 'are calling')

(22) ɲa- θɪ́ kꜜɛ́·tɔ̂ pꜜɔ́kɔ̂ mꜜɔ́rɔ̂ pɪ́·ɲ
122 160 148 137 132-26 110-101 'the child is putting the other gourd down' (ɲaθɪ̂ 'child', kɛ̂tɔ̂ 'is putting', pɔ̂·kɔ̂ 'gourd', mɔ̂·rɔ̂ 'other', pɪ̂·ɲ 'down')

5.3. Grammatical downstep. High tones in a number of grammatically defined contexts are lowered (downstepped) following high tones:

(a) The high tone stem of verbs in the Imperfect Aspect:

(23) wá-nɪ́ndɔ̂ kâ 'we sleep here' (nɪ̂·ndɔ̂
145 130 125 113-103 'sleep')

(b) The suffix of the verb in Qualitative forms:

(24) bɪ̧·lꜜɔ́ 'to do tasting or dipping'
110(b) 135 110

(25) ɲa-θɪ́ bꜜɪ· - rꜜɔ́ 'the child is coming'
115 143 135 110

This example also contains an instance of implicit downstep: ɲaθɪ̂ + bɪ̂·rꜜɔ́ ɲaθɪ́ bꜜɪ·rꜜɔ́

5.4. Lexical downstep. Many words contain built-in (unpredictable) downstep (see Fromkin 1972 for a general discussion of this phenomenon):

(26) ŋɪ̂ɛ̧́· - lꜜɔ́
125-138 115-108 'python'

(27) ndɛ̧́· - dꜜɛ́
113(nd)138 118-110 'purse'

It is clear that 5.1-4 all embrace the same phenomenon from a phonetic standpoint.

6. Downdrift

The essential characteristics of downdrift are that it is (1) a gentle pitch fall, i.e., the rate of fall is much less than with a falling tone, (2) a constant fall, i.e., the rate of fall remains constant, again unlike a falling tone or the transition between two tones in the absence of downdrift, (3) a continuous fall (consonantal environment permitting, i.e., a fall which operates within syllables and across syllables (and words) in essentially the same fashion. In Luo under certain conditions downdrift operates unimpeded, while in others its operation is attenuated or suspended. We note, however, that unlike Hausa (Schachter 1965, cited in Hombert 1974), downdrift operates both in declarative and interrogative utterances. Interrogatives in Luo are characterized by an initial placement of pitch which is much higher than with declarative utterances (some data on this is presented in Creider 1975).

6.1. Unimpeded downdrift.

(a) of low tones

A sequence of low tones (including utterances of a single syllable) is affected by downdrift. In addition low tones preceding a high falling tone on a non-stem syllable are subject to downdrift.

(28)	pι·θ 118-103	'wealth in cattle'
(29)	pa·la 110-95	'knife'
(30)	pɛ 123-98	'hailstone'
(31)	gwɛ· - nɔ 105(g)115-90	'chicken'
(32)	kιɛ·wɔ 120-95	'to paint, paddle'
(33)	ra-wɛ· - ra 113 113-103 95	'boy'
(34)	pala bɛ·r 125 - 93	'the knife is good'
(35)	ɟi okę - lo pa·la 133 128-120 115-103	'the people have brought a knife'
(36)	rʊǫ - θ ɔnɛnɔ rawɛ·ra 128(r)133-125 125- 98	'the chief has seen the boy'

(b) of high tones

Similarly any sequence of high tones (including utterances of a single syllable) ending in a high tone or (on a non-stem syllable) a high falling tone is subject to downdrift.

(37)	mǫ́·n 138-123	'women'
(38)	gʊ̨ę́·n 121-112	'chickens'

(39) sî 'pullet'
139-125

(40) a - gʊ̂· -lʊ̂ 'pot'
118 130-123-115

(41) mộn nígí nệló mɔ̂·kɔ̂ 'the women have some wire'
135 - 103 (continuous fall)

(42) ɟi ní-gí sî 'the people have a pullet'
118 123 118 113

(43) píɲ nígí lệ 'the country has game'
125 113-110

6.2. Attenuated downdrift

(a) of low tones

Downdrift of low tones is partially or completely suspended by a following high or (stem syllables only) high falling tone. Under certain conditions upsweep is found also (see below section 7).

(44) ruọθ ɔ-nɛ- nɔ sî 'the chief has seen the
125 123 120 123-110 130-118 pullet'

(45) ɟi o - kɘ - lo pa - la má-bɛ̂·r
133 125 123 123 118 125 125 130-113 'the people have brought a good knife'

(b) of high tones

If a high tone sequence ends in a low tone, a downstepped high tone or a high falling tone (stem syllables only), downdrift may be wholly or partially halted. Again upsweep is sometimes found.

(46) pá-lá bɛ̂·r 'ochre is good'
138 140 135-110

(47) píɲ nígí lẹ́ mȧ-θọ́ˆθ 'the country has much
140 140 140-153 135 110-105 game'

(48) wj-wá pók ó - wj·l· 'we have not forgotten'
128 140 145 150 112-107 (lit. our heads have not yet been twisted)

7. Upsweep

A very interesting intonational phenomenon in Luo is that of upsweep--a relatively rapid rise in pitch which may extend over several syllables. A partial and incomplete generalization which may be made is that upsweep occurs in those environments in which downdrift is attenuated. Upsweep is not an inverse of downdrift, however. It is a more localized phenomenon, being most noticeable in the syllable immediately preceding a tonal change. Thus it is regularly found within single words of the H + D, H + L, H + F (where the F is on a stem syllable), L + H, L + F (where the F is on a stem syllable).

(49) ndẹ́·- dė 'purse'
125-145 108

(50) pɛ́· - nɔ̀ 'that hail'
143-150 150-103

(51) ŋgʊ́·r - mè 'pig'
128-140 100
(52) gɪ́ - mɪ́ɛ·l 'they have danced'
135-150 158-100
(53) r - ɟ - ŋó bɛ́·r 'the meat is good'
113(r) 124-132-145 155-105

Upsweep is also found in longer sequences where the conditioning tone is in a following word. Even here, however, it rarely extends more than a few syllables back from the conditioning syllable.

(54) ɔr kɛ̧́-ló gʉ̧́ɛ̧·n 'the brother-in-law brings chickens'
123-130 140-148 118-113
(55) ɟi nɛ́ - nɔ́ lʊ́·m 'the people see the grass'
113(ɟ)125 135 145 100
(56) bɪ́- m kó̧ - c cɔ̀·θ 'the baboon is very cruel'
95(b)138-155 138-140 130-97.5

8. Discussion

A recent paper by Hombert (1974) constitutes the point of departure for our discussion of downstep and downdrift in Luo. We would like to acknowledge the stimulation of this paper, and also to indicate that we are in complete agreement with Hombert's principle thesis that tone (i.e., lexical and grammatical tone) and downdrift interact with one another in important ways.

Hombert proposes an ingenious perceptual explanation for the occurrence of downdrift over consecutive high tones: such downdrift is found just in those languages where there is no mid tone or downstepped high to create a perceptual confusion in that position. We see immediately that Luo is a language which at first examination appears to be a counter-example to Hombert's hypothesis since in Luo downstepped high tones are of frequent occurrence. However, closer examination shows that since sequences of high followed by D are characterized by upsweep, the need to avoid the fall (due to downdrift) of consecutive high tones is obviated. That is, upsweep may be seen to be an alternative to suspension of downdrift which is available to languages with downstep (and perhaps mid tones).

In our discussion of downdrift and downstep in Luo we have differed with Hombert in one important terminological respect: for Hombert downdrift is "the lowering of like tones (consecutive or not) (1974:172)." Throughout this paper we have been careful to distinguish downdrift from (explicit) downstep. At this point we may summarize our reasons for so doing. While downdrift and downstep are both intonational phenomena in the sense of operating across word boundaries (Lehiste 1970:54) we feel that downstep is more nearly a tonal process than downdrift (which is purely intonational) and that in sum there are sufficient differences between the two processes to warrant their being distinguished terminologically. Some of the differences which have led us to this conclusion are the following:

(1) Explicit downstep is readily convertible, via sound change, into grammatically significant downstep. We have no evidence that suggests that downdrift may be similarly 'grammaticized'.

(2) The domain of downdrift is both greater and smaller than that of downstep in the sense that downdrift operates within a single syllable and across stretches of many syllables. The operation of downstep is always specifiable in terms of an interaction between two adjacent syllables.

(3) Although we are not able at this point to provide instrumental evidence for our conjecture, it seems to us that the notion of a 'change of key' in downstep is a valid one and that tonal relationships are preserved unaltered after a change of key. Downdrift is inherently 'atonal' and neither produces a change of key or is localizable in a key. (In partial support for this claim we may note that Luo speakers are readily able to assign tonic sol-fa values to Luo utterances (including instances of explicit downstep), but cannot handle downdrift in this fashion.)

(4) It is possible to see downstep (including explicit downstep) operating when the operation of downdrift is suspended. Examples:

(57) ɔmák(ɔ) a|ų̆rû kǫ̍ró nî 'he has just caught a quail'

(here the final word suspends downdrift on kǫro but does not prevent downstep from operating).

(5) Most importantly, downdrift and downstep are not in complimentary distribution: it is readily possible to see downdrift superimposed on downstep. Examples:

(58) rawɛr(a) ɔmak(ɔ) a|ų̆rû kǫ̍·rô 'the boy has caught a quail now'

(with both downstep and downdrift on the final word)

(59) wɩɲɔ́ wę̍̂r 'the bird sings'

(downstep and downdrift)

(60) wɩɲɔ́ wę̍r ahî·ɲâ 'the bird sings much'

(downstep, both explicit and implicit; downdrift only on last word).

9. Summary

In this paper we have tried to accomplish three objectives: (1) present a relatively thorough documentation of the operation of a type of downdrift which is not widely known. (2) report on the existence of a new intonational phenomenon, upsweep. (3) present a terminology which is geared to the requirements of Luo, but which may readily be utilized with other tonal languages. In connection with this we have tried to show how phonetic data support our terminological suggestions.

We believe that in Luo downdrift and downstep (as we have defined them) are integrated parts of an intonational system. We would, however, suggest that it will be more profitable, in the search for cross-language explanations of these phenomena, to consider the possibility that the two phenomena will have explanations which differ in at least some important respects.

Footnotes

[1] The Luo utterances analysed with the pitchmeter were first recorded on a Nagra 4.2 and then fed into the pitchmeter. The pitchmeter output is recorded on light-sensitive paper and numerical readings may be obtained from this paper output. The accuracy of the pitchmeter is about one per cent. At 100 Hz (which is approximately the base line of the Luo speaker who was recorded) this amounts to 1 Hz. Most of the pitch phenomena we discuss are spread out over a range of at least 10 Hz. The operation of the pitchmeter is discussed in Léon and Martin (1972). We would like to thank Professors Léon and Martin for their kindness in allowing us to use the pitchmeter, and also to thank Professor Malcah Yaeger for her persistence in encouraging us to use it.

[2] Explanation of non-tonal notation: θ and ð are dental explosives; the cedilla is used to mark inherently close vowels. The quality of such vowels is in some instances quite distinct from that of vowels which are close due to vowel harmony processes. Compare ðǫ·gį́ 'your cattle', ðó·gį 'your mouth' (ðǫ·k 'cattle', ðɔ·k 'mouth); kȩlû̧·rú̧ 'bring (pl.)!', kelû̧·rú̧ 'plant apart (pl.)'. (kȩ·lo 'to bring', kɛ·lɔ 'to plant apart').

Tone is highly functional in Luo both grammatically and lexically. Minimal pairs abound: kį·c 'orphan', kį́·c 'bee'; ɔlá·ŋ 'bell', ɔlâ·ŋ 'black ant'; kȩ·ndo 'hearthstone', kȩ·ndó 'again', kȩ̂·ndȯ 'marriage'; amǫ̂·so (ɟi) 'I greeted (the people)', ámǫ·só(ɟi) 'I am greeting (the people)'; ámǫ·sȯ 'I am greeting', etc.

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Tone Melodies and the Autosegment*

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1. Introduction

In this paper, I would like to present a theory of tonology--and in fact, a general extension of the theory of phonology--which has as one of its consequences the prediction of the behavior of tones in some ways that are puzzling and even paradoxical from the standard generative view. I shall concentrate here on one kind of behavior that is very familiar to any linguist who has worked on African tone languages: when a vowel desyllabifies or is deleted by some phonological rule, the tone that it was bearing does not disappear--rather, it shifts its location and appears on some other vowel.

Needing a name for this phenomenon, I shall refer to it as 'stability'--that is, the tone melody has its own stability above and beyond that which the vowels provide. Stability, then, in general will be the property of some aspect of the linguistic signal which maintains itself independently of the other aspects. In this case, we note that the tone melody sustains itself independently of modifications occurring to the syllabic structure.

2. Conspiracies

What lesson is to be drawn from this odd behavior? I call it odd, though I have not yet shown that tone stability is an oddity from the standard generative point of view. Let us examine why it is so, and a natural way to do so is to see that ways have been developed within the standard generative framework to deal with tonal phenomena in African tone languages. Only then can we learn what stability tells us about these languages.

I shall consider two examples from the literature, but they could be multiplied easily. In both we find recourse or reference to the notion of 'derivational constraint' or 'conspiracy'. A conspiracy, of course, is a pointed way of referring to a kind of derivational constraint: in this case, we are dealing with derivational constraints of conspiracies to move around the tonal specifications from vowel to vowel in order to find, on the surface, the same tone melody that occurs underlyingly. This is not to say that there are no tonal rules that delete or modify the tonal melody--there surely are such rules. Nonetheless, the normal, 'unmarked' case is where the tone melody survives the effects of phonological rules.

If the tone of a vowel is specified by its features--±High and ±Low, let us say for the sake of discussion--then the pitch of the vowel is just like any other of its characteristics, like its tenseness, roundedness, and so forth. If a phonological rule should delete that vowel, then its tonal specifications are deleted along with all of its other properties. Suppose we have a phonological rule deleting a vowel as in (1).

(1) $V \rightarrow \emptyset \; / \; \_\_ \; V$ V-Deletion

(A common Bantu rule--e.g., see Spa 1973:78, rule (32)). However, we need to save the tonal information of the deleted vowel.[1] Looking at tone as a feature of the vowel, we could do this in one of exactly three ways, all of which are similar in intent.

1. We could posit a special 'Tone copy' rule which copies the tone of the to-be-deleted vowel onto its neighbor--we could do this, I should add, if we permit two tonal feature specifications inside a single vowel segment. Let us permit this for the moment, though I have argued elsewhere that this is a formally incoherent assumption (Goldsmith 1974b); we shall ultimately have no need for such formulations:

(2) Tone Copy $\begin{bmatrix} V \\ \alpha Hi \\ \beta Lo \end{bmatrix} \begin{bmatrix} V \\ \gamma Hi \\ \delta Lo \end{bmatrix} \rightarrow \begin{bmatrix} V \\ \alpha Hi \\ \beta Lo \end{bmatrix} \begin{bmatrix} V \\ \begin{bmatrix} \alpha Hi \\ \beta Lo \end{bmatrix} \begin{bmatrix} \gamma Hi \\ \delta Lo \end{bmatrix} \\ \end{bmatrix}$

A typical derivation applying Tone Copy and V-Deletion would be as in (3).

(3) ...à í...
...à ǐ... Tone Copy
... ǐ... V-Deletion

2. Second, we could have the tone-coyping rule operate after vowel deletion, but make it a global rule looking back in the derivation to the stage just before vowel-deletion. This sounds unnecessarily complicated, and it is; it has been suggested in cases where the V-Deletion is optional and Tone-Copy should be dependent on its application. We shall not pursue this possibility here, for reasons that will be apparent.

3. Third, we could posit a general 'derivational constraint' to apply to all tonal rules--this is the approach Spa takes in his grammar of Enya, a Bantu language. He suggests (I translate): "When a segment carrying a high tone is deleted or becomes incapable of carrying a tone, the high tone is transferred to the nearest syllabic segment... [This constraint] applies each time any rule whatever meets its structural description". (Spa 1973:139 and passim). In fact, the correct statement of his derivational constraint should apply equally to preserve both High and Low tones. This modification both simplifies his phonological system and generalizes his derivational constraint.

Solutions 2 and 3 are explicitly global, and therefore suspect within received generative theory: a theory countenancing global rules approaches vacuity. Solution 3 introduces a general global condition on vowel-affecting rules, and while this seems like an improvement, in that it is a generalization, it is nonetheless worse theoretically because we now permit not only global rules, but a whole new kind of object which is global and applies anywhere during a derivation outside the set of ordered rules. Only solution 1 holds out a possibility, and yet what we find in actual work is that for every rule of vowel-deletion or desyllabification, we must set up another case of tone-copying, and what we have then is a missing generalization. But the generalization is precisely solution 3, the general derivational constraint. To do satisfactory linguistic work, we need to state a generalization; but inclusion of this generalization within the standard theory amounts to a serious weakening of the theory of phonology. We have reached a crisis in tonological theory.

We might note that even if we did include the derivational constraint, in the belief perhaps that constraining a theory must always play a more minor role than stating a generalization, three important questions would be left unanswered: first, why are the tonal features copied, but not the other features? What makes them special? Second, what is meant by a representation like (4), a contour-toned vowel produced by the derivational constraint--what does it mean for the segment to be segmented? Third, and most telling, the 'conspiracy' to preserve tonal melodies extends past a derivational constraint that whisks the tone off of a sinking vowel: in fact, in a tone language where the Derivational Constraint seems to generally hold, what we find is that vowel assimilation rules like (5) copy all vowel features up to, but not including, tone features.

(4) $$\begin{bmatrix} \text{+vocalic} \\ \begin{bmatrix} \text{+hi} \\ \text{-lo} \end{bmatrix} \begin{bmatrix} \text{-hi} \\ \text{+lo} \end{bmatrix} \end{bmatrix}$$

(5) $$V \rightarrow \begin{bmatrix} \alpha\text{tense} \\ \beta\text{back} \\ \gamma\text{high} \\ \delta\text{anterior} \\ \varepsilon\text{round} \\ \vdots \end{bmatrix} \Big/ \_\_ \begin{bmatrix} +V \\ \alpha\text{tense} \\ \beta\text{back} \\ \gamma\text{high} \\ \delta\text{anterior} \\ \varepsilon\text{round} \end{bmatrix}$$

A rule like (5) certainly exists in Igbo and Yoruba, and in Enya according to Spa (1973:47, 57). Of course, when two vowels come together, each with its own tone, whether one vowel deletes and its tone gets retained, as in (3), or one assimilates in quality in every regard save tone--the only empirical difference lies in the length and syllable quality of the remaining vowel(s). From the point of view of tone--and its 'conspiracies'--the same fate has come to pass. Yet the derivational constraint speaks only to the case with deletion, not the case of nearly-complete assimilation, as in (5)--thus missing the generalization.

This is the logic of the situation; let us look at some actual cases in more detail. These types of examples could be multiplied.

(A) The first example comes from two articles by Julie Lovins (1971a, b) on Lomongo, whose tonological rules, she suggests, 'conspire, individually or in concert, to derive surface tone patterns on words and phrases without changing the underlying melody." Central to the analysis is what Lovins calls 'tone composition', in which the tones "stay where they are when segmentals are deleted". She continues with an example, "If two vowels are juxtaposed, within a word or across word boundary, it is usual for the first vowel to be elided. Its tone remains and combines with that of the following vowel." For example:

(6).	bàlóngọ̌ bǎkáé → bàlóngǎkáé	'his blook'
	bánȁ bǎmǒ → bánǎmǒ	'other children'
	bọ̌mọ̌ bòtámbá → bọ̌mộtámbá	'another tree'
	bȁtswá là èmí → bǎtswêmí	'you who lead me away'

With a number of similar examples, Lovins concludes: "The only derived forms that occur are the ones that preserve the underlying melody...and the only way to get these derived forms is to posit a species of rule application that many linguists find objectionable." Lovins is certainly correct, given the standard framework, and she is exceptional among writers on this subject in recognizing the implications for phonological theory of the type of rule she posits.[2]

Lovins gives other examples of the melodic 'conspiracy'; they are discussed in section 5 below as examples of how this matter should in general be treated.

(B) The details of Enya, another Bantu language, that Spa presents are of essentially the same character as those presented by Lovins, at least insofar as they indicate a 'melodic conspiracy' preserving tones against the ravages of vowel deletion. I shall therefore merely mention a few examples of this sort.

The quality of noun-prefix vowels changes before nouns that begin with a syllabic. Whether this is entirely by deletion, as by Rule (1), or by assimilation up to, but not including, tonal information, or both, is not entirely clear.

(7)		/mè + tábè/ →	[mètábè]	'branches'
	Class 4	/mè + ẹ́lȉ/ →	[mẹ̀ẹ́lȉ]	'moons, months'
		/mè + ȉsà/ →	[mȉsà]	'poles'
	Class 3	/mò + ẹ́lȉ/ →	[mẹ̀ẹ́lȉ]	'moon, months'
	Class 10	/ṇ̀ + úpú/ →	[ṃ̀ṃ́pú]	'odor'
		/ṇ̀ + óyá/ →	[ṇ̀ṇ́yá]	'vapor'

In short, deletion and 'total' assimilation of syllabic segments procedes without affecting the tonal contours.

(C) In Yoruba processes of this sort are found, too. The preposition ni is inherently High-toned. When followed by an object starting with a vowel--the usual case--the i elides. If the remaining vowel (that is, the vowel that the object of ni begins with) is any vowel but i, the n of ni becomes l. Thus

(8) /ní + i̍lé/ → [nílé] 'at home'
/ní + òní/ → [lóní] 'at today' (see text)
/ní + òde̍/ → [lóde̍] 'at outside' (see text)

The same processes occur with the verb *ni* 'have'.

(9) /ní + o̍kò/ → [lókò] 'have canoe'
/ní + òkọ̀/ → [lókọ̀] 'have spear'
/ní + íru̍/ → [níru̍] 'have hair'

These tonal markings must be taken with the following interpretation: the vertical accent is Mid; Yoruba has three surface pitches. In all cases the second tone of the object undergoes the effects of the underlying first tone. A High or Mid on the first syllable causes a following Low to be realized as a Falling tone (a flop rule: see (12) below). A Low tone on the first syllable causes a following Mid or High to be downstepped, and a Low tone on the first syllable causes a High on the following syllable to be realized as a Rising tone (again, a flop; this occurs along with the just-mentioned downstep or downdrift).

These processes occur generally in Yoruba; they occur in the object in the *ni+object* construction just as elsewhere. The surface realization of *ni+object* has a contracted vowel/tone combination, as we have seen. The result of the contraction is a vowel with the quality of the object's initial vowel (ni+oni → loni, e.g.); the tone of this vowel will be either (a) High, from *ni*, or (b) the merger of High and the underlying tone. This varies from speaker to speaker. Thus ní+ọ̀kọ̀ → lókò may be uttered with a Falling tone on the initial *o*: lôkò, preserving, conspiratorially, the underlying melody.

3. Autosegmental phonology

So much for conspiracies or paradoxical problems for the standard theory of phonology. We proceed to a solution.

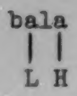
We need a new formalism--one which presents, or re-presents, what we know is central to tone behavior, but one which does not saddle us with formal paradoxes. We know that, tone features aside, the features of the vowels and consonants behave unexceptionally. That is, the standard theory of how vowels and consonants are segmented and how features are unordered inside the segment is precisely correct. We do not want to wander through the wilderness for a theory of consonants and vowels in these respects: we have one that is essentially correct. So we shall start with the premise that the formal representation for vowels and consonants with regard to their non-tonal features is as in, say, *Sound Pattern of English.*[3]

What do we want to do with tonal specifications? One thing we know from the start: the standard answer, which treats the tonal specifications as features of vowels, is inadequate.

Yet the tone melodies are *segmented*, in the primary sense of the word: the tone melody is composed of smaller, repeatable units, the tonal segments. The obvious proposal to make, then is that the tone melody also composes a segmented line--a second tier of segments. To complete the representation, we will need association lines between the string of phonological segments, and the string of tonological segments. For a vowel to be associated with a particular tone will mean that it is uttered at that tone's pitch.

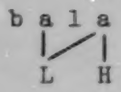
For example, now, if we have a two-syllable word 'bàlá', this is represented:

(10)

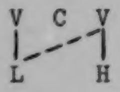


If it should undergo a rule (we might call this a 'flop' rule for geometric reasons) and gain a rising tone on the second syllable by 'assimilation', then we will represent this as in (11), and the Flop rule that creates it will be as in (12).

(11)



(12)



The dotted line in (12) represents the structural change. In (11) there is no one-to-one correspondence between tonemes and syllables, but that is exactly what we know happens in tone languages--this remarkable feature of the formalism is precisely what we would desire in a formalism.

Now we shall see that the formalism that is sketched above--which I call 'autosegmental phonology'--is the solution to the paradoxical situation discussed in sections 1 and 2. The existence of the tone melody's 'stability' was our concern: how could it be that a tone refused to be deleted when its vowel was deleted?

But in our new formalism, this is precisely what is predicted. In any theory of generative phonology (and this one is no different), a deletion rule deletes a segment. Now, if a rule ((1), for example) should delete a vowel, it does not delete any of the tone segments that the vowel is associated with, since those tone segments are quite separate segments. The worst that can happen is that the tone segments will be left 'orphaned' or free, without a vowel associated with it. And this will be the interesting case to look at in detail.

I would like to emphasize the point we have just seen: the 'stability' phenomenon, formerly paradoxical, has become a natural consequence of an autosegmental generative system--not by proposing a constraint on rules, but rather by proposing in effect a new geometrical shape (in a somewhat abstract sense) for formal representations. We may observe, too, that this representation could be likened to a theory of co-articulation of the mouth and some of the laryngeal (pitch) features.

One further extremely important point about autosegmental representation must be made. A Well-formedness Condition is placed on representations which expresses a good deal about their 'geometry'.

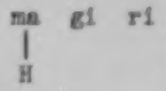
Well-formedness Condition

(1) All tones must be associated with at least one syllabic segment in the other tier;
Conversely, all syllabic segments in the upper tier must be associated with at least one toneme in the tone tier.

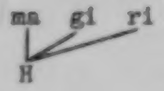
(2) No association lines may cross.

This well-formedness condition does not throw out representations that do not satisfy it ((13), e.g.); rather, we interpret the well-formedness condition to add or delete association lines in a minimal way (generally by minimizing the number of line additions or deletions) so as to meet the well-formedness condition as completely as possible. Thus (13) is converted by the well-formedness condition to (14) by the addition of association lines. This well-formedness condition is not a rule, nor a derivational constraint; it is a definition of the formalism--which is not to say that it does not have striking and immediate empirical consequences, as we shall see.

(13)

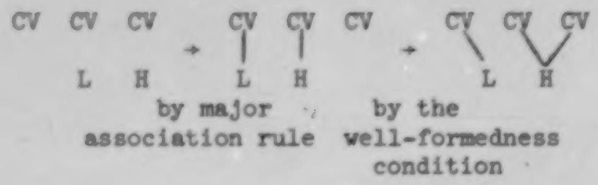


(14)



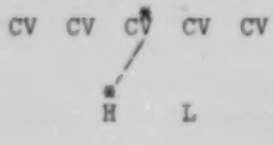
In originally associating a syllable with its tone, languages have recourse to two types of procedures (see Goldsmith 1975): either they spread out one-to-one from a boundary, as in Mende (see Leben 1973) (figure (15)) or a tone is specifically associated with a correspondingly marked syllable.

(15)



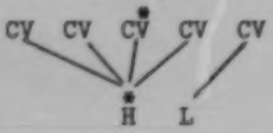
That is, a syllable of a word can be marked as the specific one that a certain tone is to be coordinated with. I shall use a 'star' in either tier to indicate which segments are marked to associate with each other.

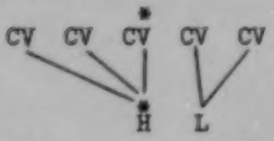
(16)



(as in English, for example)

In Bantu languages, it is not uncommon that a specific syllable is marked to be the one which the tone connects to. In such cases, as in (16), the well-formedness condition intends to spread the tone melody over the yet-unassociated syllables; however, there is an apparent ambiguity regarding the final two syllables: does the H spread there (as in (17)) or the L (as in (18))?

(17)

CV CV CV CV CV
*
*
H L

(18)

CV CV CV CV CV
*
*
H L

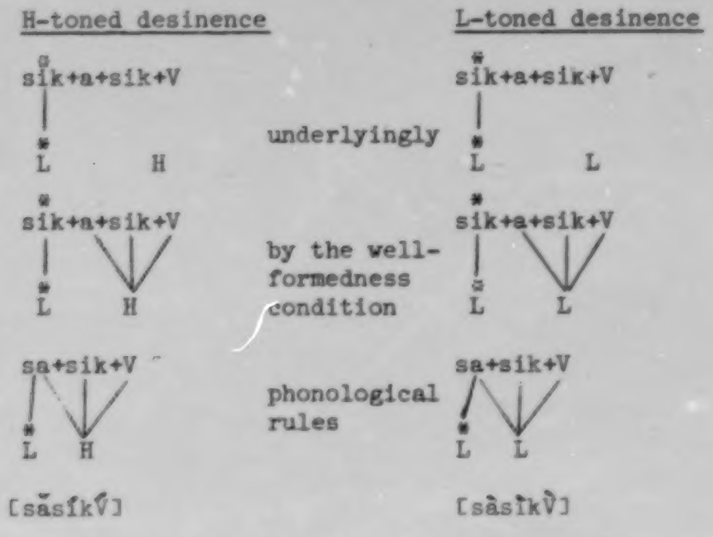
Without exception (English, Sanskrit, Japanese, and Tonga have been examined in detail in this regard), the unstarred toneme spreads; thus (18) is produced by the well-formedness condition, not (17). Functionally, we may regard this as a preservation of the prominence of the accented syllable, which would be lost if (17) were derived.

With this machinery at our disposal, we may return to Lomongo.

4. Lomongo reduplication: a reanalysis

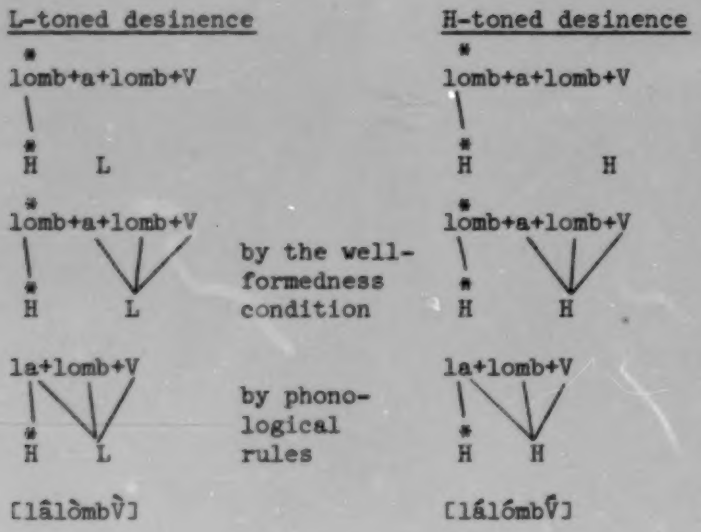
Let us consider in more detail the reduplication treated by Lovins (1971a, b). Verbs are lexically marked for tone, H or L: the stem is reduplicated and an a infix is added between the two copies of the stem. An L or H tone desinence then follows.

(19) L-toned stem /sìk/ 'stop'


H-toned desinence
L-toned desinence
sik+a+sik+V
L H
underlyingly
sik+a+sik+V
L L
sik+a+sik+V
L H
by the well-formedness condition
sik+a+sik+V
L L
sa+sik+V
L H
phonological rules
sa+sik+V
L L
[sǎsíkV̂]
[sâsìkV̂]

(The last stage is reached by purely phonological rules: k → 0; and ia → a).

(20) /lómb/ H-toned stem 'be shy'



In short, from the notation we get the 'conspiratorial' results automatically by keeping the syllabic and the tonal levels formally separate. It may be noted that we get the desinence-tone spreading automatically, too, as well ay a formal understanding of the notion 'contour tone'. Furthermore, the process of total vowel assimilation--construed, as, e.g., (21)--has the desired property of copying all features up to, but not including, tone features, since tone features aren't features of vowels.

(21) X - [+syllabic] - [+syllabic] - Y

1 2 3 4 →
1 3 3 4

5. An autosegmental analysis of Igbo

In section 4, we observed that conspiracies of the sort discussed in section 2 are straightforward consequences of the autosegmental representation. In deleting a vowel, we do not delete its tone; rather, its tonal segment finds some other place to associate.

This conclusion came about by viewing tones as segments on an equal rank with 'phonological' segments. This parallelism can be pursued; in fact, we find in general perfect formal symmetry between the two levels. The 'dual', then, of vowel deletion would be tone-deletion, followed by reassociation to another tone by the vowel that had been associated with the deleted tone.

A particularly instructive example of this sort is found in Uhũhũ Ibgo (Green and Igwe 1963). Igbo has three underlying tones--High, Mid, and Low, where Mid in this dialect is a downstepping High. That is, when Mid is uttered after a non-Low tone (High or Mid), it has the pitch of a High that has been downstepped as if by an intervening 'phantom' Low tone. In this dialect, however, the downstep has been systematized as a third underlying tone, the Mid. In any event, the Mid and the High are phonetically indistinguishable after Low.

The II Main form of the verb has the following pattern: it consists of the subject NP, followed by the /a/ verbal prefix, followed by a verb stem, optional suffixes, and any objects the very may have. In tableau:

(NP subject)	a prefix	CV verb stem	CV CV ... suffixes	(Direct Object)	Etc.

The tone of the verb stem and the prefix is as follows:

			AFFIX	STEM
(22)	(i)	For lexically Low-toned verbs:		
		When the subject ends in Low tone:	"High"	Low
		When the subject ends in High tone:	Low	Low
	(ii)	For lexically Non-Low verbs:		
		When the subject ends in Low tone:	Low	"High"
		When the subject ends in High tone:	Mid	"High"--that is, on the same pitch as affix

I have put "High" in quotation marks where it occurs in a position where High and Mid are indistinguishable on the surface. Furthermore, we must note that a High following a Mid is realized on the same pitch as the Mid.

Such a superficial description is misleading. The alternations displayed there are quite simple when stated autosegmentally. Note first that the second row in both (i) and (ii) is simpler; in particular, the affix and the stem are on the same pitch for both Low and Non-Low verb stems. (It is crucially important to recognize that the High-toned form in (ii) could not be written 'M M', because that would mean a downstep between the affix and the stem, which does not occur.)

What is happening here is that the underlying forms are as in (23), which is realized on the surface when the subject ends in a L-tone.

(23) Low-toned verbs

affix	verb
H	L

Non-Low toned verbs

affix	verb
L	M

The Low-toned verb shows up as such; the non-Low toned verb shows up as Mid, a common occurrence throughout the Igbo verb forms. The affix is, in effect, dissimilated from the stem. To derive the tonal forms when the subject ends in a High-tone, there is a rule (24) which deletes the affix tone following a subject ending in H:

```
(24)  H ┌ ┌T                        Condition: Last-cycle: I
        │ └ affix                     Main form occurs only
        └ verb                        in non-embedded forms.

      1    2 →
      1    Ø
```

For example,

```
(25)  Low-Toned Verb

      (a)  # Adha # a+za+a #   'Adha has swe[illegible]...'
           | |  | | |  | | |
           # L  H #(H) L H #   Underlying
                    ↓↖
                    Ø  Rule (24)

           # Adha # a+za+a #
           | |  | |    | | |
           # L  H #    L H #

           # Adha # a+za+a #   By the well-formedness
           | |  | | \ /  | |   condition.
           # L  H #  L   H #   'Àdhá àzàá...'

      (b)  High-toned Verb
           'Adha has carried bags'    'The chief has carried bags'

           # Adha # a+ci+a # akpa #    # Eze # a+ci+a # akpa #
           | |  | | |  | | | |   |     | | | | |  |  | | |  | |
           # L  H #(L) M H # L   L #   # H L # L  M  H # L  L #
                    ↓   by rule (24)
                    Ø

           # Adha # a+ci+a # akpa #
           | |  | |    | | | |   |         No change
           # L  H #    M H # L   L #

           # Adha # a+ci+a # akpa #
           | |  | | \ /  | | |   |         No change
           # L  H #  M   H # L   L #

             [Àdhá 'ácíá àkpà]             [Ézè àcíá àkpà]
```

Notice that the final form in (25b) has an M associated with two vowels. This can mean only one thing: the two syllables are uttered at the same pitch, of course, with the 'a' downstepped from the subject-final H of 'Adha'. And this is the correct result as indicated in (22).

6. Conclusion

It is not uncommon to find the observation made that in African tone languages, the tone melody seems to act almost independently of the syllable structure. It is another matter to incorporate this observation into a specific formal theory. The autosegmental framework is such a proposal; and this paper sketches the way it deals with some representative tonal rules.

Footnotes

*This work was supported by a grant from the National Institutes of Health, 5T01 HD00111-10.

[1] Note what Carl Meinhof wrote in *Grundriss einer Lautlehre der Bantusprachen*: "A syllable may disappear without leaving a trace, and yet its former existence there may still be indicated by its tone, which has been imparted to the next syllable. In this way it is sometimes found that the tones are the most persistent element in a language."

[2] We may note that one of the major rules Lovins posits--the monotony rule, spreading the desinential tone over the post-radical syllables--is no exception to the melody conspiracy, as she suggests it is. It is rather due to the well-formedness condition on tonological representations; see (19) and (20).

[3] Of course, there are small points to question, such as what features there are, whether features are binary, whether there are linkages between features, whether there are unspecified features, and so on. But these are, in context, small issues.

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Some Contributions of Central African Languages to African Linguistics, Linguistic Theory, and Language Universals*

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1. Introduction

The languages spoken in Chad, Cameroon, Central African Republic and South Sudan are among the least often mentioned in the currently available literature. For example, W. E. Welmers, whose work concerns many of the best documented African languages, writes: "Languages of the Adamawa-Eastern branch of the Niger-Congo family are not considered in any detail here, for lack of anything but the most minimal personal experience with them." (1973:197). It seems to me that the Adamawa-Eastern languages, as well as others in Central Africa, can contribute to our knowledge of African language structures, since they exhibit some interesting characteristics. Moreover, they raise certain problems of linguistic theory. And finally, some of them seem to give the lie to certain hypothetical linguistic universals. My purpose here is to successively examine these three points.

2. Contributions to African linguistics

There is no recognized family which might be termed "Central African". However, it is assumed that the facts which are presented below are characteristic of a geographical zone in which many languages, no matter what group they belong in (Bantu, Adamawa-Eastern, Central Sudanic or Chadic), bring some comparable contributions to African linguistics. A further step would be to study the possible claim that there exists a relationship between this common contribution and some typological resemblances among the languages belonging to that geographical unit.

2.1. To start with the sociolinguistic setting, I would like to point out that many of the languages spoken in North Cameroon illustrate the following fact: the amount of borrowing from Hausa or Fulani (and therefore from Arabic in most cases) parallels the amount of islamization. It may happen, since the process of borrowing is constant, that some loanwords fail to be identified, as in Hausa itself, where the "new unit" mètán "two hundred" cited by Welmers (1973:293) is the Arabic word mi:te:n. In the area where I have worked, the degree of Moslem influence is diversified, and consequently, so are the various cultural vocabularies. For example, three related languages of the Adamawa group--Mbum, Mundang, and Tuburi--can be distinguished according to the number of Fulani loanwords: low in Tuburi, high in Mbum, intermediate in Mundang (Hagège, forthcoming a).

What is worth observing is what Mbum has borrowed function markers (prepositions), like dàgà "since", hą́ "up to", and numerals like téméré "one hundred", whereas in Mundang, and still more in Tuburi, Fulani loanwords are limited to verbs and nouns. These examples and many others illustrate the behavior of African languages towards borrowing: lexical items are far from being the only ones that can be borrowed, but when grammatical morphemes are also introduced, this is related to a larger cultural influence.

2.2. Connected with this problem is the marginal situation of some Bantu languages of South Cameroon, whose phonological systems might have been influenced by surrounding languages. For example, Bafia, like other languages of the Bantu Group, exhibits a complex system of noun classes, but, unlike many of them, it also has four back unrounded vowels ɯ, ə, ʌ, and ɑ.[1] Moreover, the complex rules of tonal combinations it has in the association of the noun with its class marker are seldom found elsewhere within the group (Guarisma 1973).

With regard to other tonological features in the area, let us mention a number of languages with four-tone systems, which could be added to Bariba, Tigong and Kutep, presented in Welmers (1973:102ff.). In the fourth subdivision (Moru-Madi) of the Central Sudanic languages, as well as in Monzombo (Eastern branch of Adamawa-Eastern), four- and even five- and six-tone systems have been observed, if one includes level as well as contour tones (ER 74 1973; 115 and map IX with tonal isoglosses, which may be taken as a factual basis for whatever hypothesis one would like to propose with respect to the geographical distribution of the number of tones and its interpretation in terms of cultural areas).

Another contribution of Central African languages to our knowledge and interpretation of tonal phenomena is offered by the relatively high number of "contour languages" met in that region. Welmers, while retaining this formula from Pike, has suggested defining a contour language not only in terms of direction of pitch change, but "more specifically as one in which at least one unit toneme must be described in terms of two distinct components: the direction of pitch change, and also the position of the entire glide within the pitch range of the environment. For example, Vietnamese has unit tonemes that must be described as "high rising" and "low rising"; Cantonese has "high rising", "low rising", "high falling" and "low falling" (in addition to four level tones); Mandarin has "high rising" and "complete falling".[2] By the same definition, no known language of Africa is a contour language, though unitary rising and falling tonemes may sometimes be found, without contrasting positions in the pitch range" (Welmers 1973:81). It seems that, at least in the area where I know field work has been done, some languages are found which refute that contention: Ngbaka (Central African Republic) has three level and six (different) contour tones (Thomas 1963:20), Monzombo has four level and six contour tones, Gbandili-Bulaka (CAR) has three and four (ER 74, 1972:-15), Tuburi has three and six (Hagège, forthcoming a).

2.3. Concerning the class markers, it must be observed that most Adamawa-Eastern languages have non-class noun systems. This is not exactly the same situation, however, as in the Mande languages, which show "nothing at all comparable to the class and concord systems" found in Bantu. Moreover, there is--at least in the languages that have so far been described--no tendency towards "a reorganization of the noun classes in terms of two categories, animate and inanimate" (Welmers 1973:211; Hyman and Voeltz 1971: 57). Rather, a non-class system is found in several languages that have, nonetheless, a distinction between two kinds of nominals; resorting to distributional criteria, it is possible to posit nominals proper and to oppose them to a word-class which I suggest calling nominoids (or dependent nominals). The difference between nominals and nominoids parallels the one found in the Mande languages between "free" and "relational", itself reflecting "the distinction between alienable and inalienable possession" (Welmers 1973:212). The nominoids cannot occur without being determined by a noun or a pronoun. They are names of body parts, kinship terms or words for place relationships. But the possessor is not necessarily animate. The result of the association is often idiomatic. Thus, in Ngbaka,

mò mòkònzī 'the chief's mouth',
mouth chief

but also

mò kpé '(the) dawn'
mouth day (Thomas 1963:95)

Interestingly enough, the defective class of items here termed nominoids is paralleled in some languages by a defective class of verbs. This will be expanded below (see 2.6).

Another vestigial class system is found in Banda (Central African Republic). This language has two sets of nouns, of which one is and the other is not combinable with the plural marker. This distinction does not correspond to the one between animate and inanimate (see Cloarec-Heiss 1972:37-39).[3]

2.4. Concerning the verbal inflections, one feature which is worth mentioning is the change of verb stem according to the plurality of the object, of the subject (or of both), or of the action (iteration). Mundang and Tuburi present the following distinctions:

	unmarked (singular or plural)		marked (plural only)
Mundang			
	gbə̀	'to catch'	gbà
	lò	'to pull'	lwə̀
	pì:	'to plant'	pyæ̀:
	byà	'to beget'	ràk
	kà	'to be sitting'	ɦì
Tuburi			
	tʃā:	'to chop'	tʃār
	lwáʔ	'to dream'	lwáɗ
	mā	'to lift'	ɦō:

As can be seen from the above examples, there are verious degrees of changes, from vowel alteration to complete difference of stem. The same kind of verbal inflection in relationship with various types of plurality has been observed, within Niger-Congo, in Banda (Cloarec-Heiss 1972:107), Ngbaka (Thomas 1963:144), Bantu (the extensions mentioned in Welmers 1973:340 and exemplified in Guarisma 1973:119) and Efik (Welmers 1973:335). It is found likewise in Chadic, e.g. in Bachama (Carnochan 1973:101). Outside Africa, this kind of inflection is found in a number of languages, such as Ostiak and other members of the Uralic family (Sauvageot 1971:349 and, for Nenets, 355-6), New-Guinea languages such as Toaripi and Kiwaian (Wurm 1972), Athapaskan languages such as Navaho, Chipewyan, Dogrib (Hoijer 1973:30-42), Salishan languages, and, for a small set of verbs, Ainu (Haguenauer 1952:481). Naturally, the reason why there is something remarkable here is that most of these are languages in which only some verbs present the phenomenon, and neither the verbs nor the nouns are normally inflected, in the classical sense of the term.

2.5. Another feature which could be retained for the sake of general considerations in African linguistics has to do with the syntactic behavior of ideophones. In Guidar and Guiziga, and probably in other Chadic languages of North-Cameroon (cf. Hagège, forthcoming b), some ideophones, usually accompanying particular verbs of motion or of moral attitude, may themselves be used as predicates without the verb. But, in that case, there are two kinds of restrictions: first, on the set of possible aspectual morphemes, second on the set of subject pronouns. The emphatic pronouns are the only ones found before the ideophone in predicative function.

2.6. Finally, I should like to mention a syntactic particularity found in Mbum, Mundang and other Adamawa-Eastern languages: there exists a class of defective verbals that I have proposed (Hagège 1971:96-97) to call verboids (not to be confused with verbids in Ewe, according to Ansre 1966). They are defined by the impossibility of their being used outside a restricted range of constructions, e.g. with adverbs or adverbial complements such as prepositional phrases. I have proposed the term syndesmon to characterize that kind of syntactic joining, which yields neither a verb phrase, nor a complete sentence, and should therefore be designated by a specific term. The syndesmon could be compared to the facts described in several Mande languages, the difference being that the complement which accompanies (i.e., in Mande, precedes) the verb is not an adverbial but a direct object.

3. Contributions to linguistic theory

Each of the facts that will now be commented on should naturally be presented in detail in a specific article. My intention here is merely to provide an overview of the contributions that have a theoretical interest.

3.1. Concerning segmental phonology, a striking phenomenon is the use of the same distinctive feature within three different series of the phonemic paradigm in Mundang. This language has glottalized ɓ and ɗ , parallel with non-glottalized b and d, but also mʼ and nʼ parallel with m and n, and even yʼ and wʼ , parallel with y and w (wˆ and yˆ are also found in Tuburi and Duru). This is rare in the phonemic systems that are known: Trubetzkoy (1939:143-144) writes: "It is difficult to find a language in which not only stops and fricatives, but also sonants (i.e. nasals and continuants) would be differentiated by the same feature. Among the languages we know, Irish is the unique one which presents such a character."[4] I think Trubetzkoy would have been less amazed, had descriptions of Pacific languages been available to him: Iaai of Ouvea (Loyalty Islands), to mention just one, has, according to D. T. Tyron (1968) the voiced-unvoiced opposition not only within stops and fricatives, but also within sonants (see Hagège, forthcoming c).[5] What I should like to point out is that the highly economical use of the same oppositive possibility (in Mundang, glottalized vs. non-glottalized) to enlarge the number of distinctive units could itself be brought forward as an argument in favor of the existence of system organization and system constraints. This is not unimportant if one thinks that, with the exceptions, perhaps, of Sapir and some of his disciples, the reality of the phonemic paradigm has, indeed, been ignored or rejected by many theoreticians, including generative phonologists.

3.2. Concerning suprasegmental phonology, one of the widely used notions towards which some reservations might be raised in the study of Central African languages is the notion of tone replacive. Taken from Gleason (1961:74), in which it is used to designate segmental phenomena, the notion of replacive has been adapted to African tone languages, and applied to the sitution in which "the inherent or stem tone of a morpheme does not appear; in its place is another tone which has morphemic status in its own right." (Welmers 1973:132). Languages like Bafia (Guarisma 1973) or Banda (Cloarec-Heiss 1972), whose noun and verb systems, respectively, have complex rules of tonal combinations, compel one to give up the notion of replacive, which implies unrelatedness between forms, and to restitute an underlying form according to a principle of maximum variation. Starting from such a form, all morphotonemic alternations become clear and easy to account for. For example, in Banda we find

nā 'to go' / ná 'went' (Cloarec-Heiss: 70-71).

Instead of contending that the perfective corresponds to a morpheme defined as "high replacing stem tone", it is much clearer, for an account of the whole verb system, to posit the following process:

*nā (stem) + v́ (perfective) → *nāá
*nāá → *nā́ (vowel simplification)
*nā́ → ná (tone assimilation and absorption. Many other examples in Bouquiaux 1970 and Van Spaandenck 1971).

This restitution illustrates the rules reflecting the linguistic competence of the Banda speakers, whereas the notion of replacive fails to capture such generalizations, and implies a confusion between the definition of theoretic entities and the analytic procedures requested to discover them (see Halle 1959:12).

3.3. As an indirect and ethnophonological confirmation of the psychological reality of tonal morphemes, I should like to adduce the following fact: many of the speakers of Gbaya (Central African Republic) associate the high gone with men and with the verb bɔ́ 'take!', the low tone being associated with women and with the verb tɛ̀ 'come!'. In other words, the high tone "takes" or dominates, as the men ordinarily do in this type of society, and the low tone "comes" or is dominated, as the women are. This is precisely what is reflected in the noun phrase, where a low tone may become high at the end of a derivation, whereas a high tone is never dominated, i.e. does not change (Monino-Roulon 1972:115).

Another case of consciousness of tones is found in Duru (Adamawa). According to Bohnhoff (1971:26) "Durus are conscious enough of their three tonal levels ("voices" in Duru), that they have given each a name: yég 'mèng 'high voice', yég waa 'mid voice', and yég gbɔ̀ɔ̀ 'low voice'. These designations confirm the fact that, outside the languages where the classical names attributed to the tones are in relationship with a writing tradition, like Chinese or Vietnamese, several exclusively oral languages do have expressions to refer to tones. Consequently, we may speak of the psychological reality, or, more precisely, the ethnophonological reality of tonal phenomena.[6]

3.4. To come now to problems of syntax, let us examine some nominal compounds in Mbum. One could be tempted to call "asyntactic" a type of association broadly used in this language. It consists of sequences that might reflect an ancient stage, but do not correspond to the syntax of today:

Ex. zì-ndôk-mòkón 'lack-finger-three (to reach ten)'
= seven
ɓáŋ-gûn-ɗùk-mbàm 'take-child-escape-rain' =
Biophytum petersianum Klotsch.[7] (Hagège 1971:164
and 166).

No Mbum sentence may, in today's speech, contain a verb preceding its subject, or a verb without a subject. Such types of compounds have theoretical interest in that they show that linguistic competence does not necessarily correspond to a single system. Two or more synchronic strata, representing different syntactic systems, may coexist in the competence of one and the same individual. The consequence is that certain rules apply on the sentence level, but do not apply on the compound level, where other rules are found instead. It is therefore necessary to specify the range of application of the rules and thereby to determine if the synchronic viewpoint which most contemporary linguistic theories are based on can be maintained without explicitly defining what this implies as to the number of different systems to which the individual's competence corresponds. A linguistic theory is inadequate if it does not allow a formalism by which the rules reflect polysystemic possibilities.

3.5. Just as the sentence level does not necessarily reflect the same system as the compound level in one language, so it is important to ask whether there exists a higher level or not. Transformational grammar has indeed limited most of its investigations to the sentence and its subdivisions. But in many languages, there are facts which cannot be accounted for if one remains imprisoned within this framework. The only way to explain them is to consider as a unit something larger, i.e. the paragraph.

In Mundang and Tuburi, we find personal pronouns that refer to the subject of a declarative or "psychological" verb, even if this subject has occurred in a very remote previous sentence of the same speech act. I have proposed the term *logophoric* for these pronouns, which are coreferential with the author of the discourse or experiencer of the psychological situation: in Tuburi, for example, we have:

sā:rā *dús* *sō*
logoph. plural scatter so '(They said that) they
scattered in that manner' (Hagège 1974:298).

The term *sā:rā* here does not refer to people belonging to the situation or to the linguistic context. It is not, therefore, anaphoric. It cannot be understood, unless we posit in the deep structure a declarative verb, i.e. unless we consider it as a reduction of something which, in English, corresponds to "they said that they". But we do not have to imagine or hypothesize such a structure, for it actually is the very one we have: in such a case, the beginning of the speech paragraph (we are dealing with an exclusively oral language) necessarily contains a verb "to say". Since this introductory verb occurs once in the beginning and is never repeated, it is obvious that there is no possible underlying sentence, unless we decide to treat the whole paragraph as a linguistic unit.[8] If I am not mistaken, this is not feasible, or at least very difficult in the present state of standard transformational theory.

4. Contributions to language universals

I shall limit myself to two points: (1) function markers (prepositions or postpositions), (2) relative clauses, center-embedding and comprehensibility.

4.1. *Function markers*. According to a conception of grammar with which Postal has been credited by Lakoff (1965), and which is also expressed in Ross (1966), Becker and Arms (1969) and others, "grammatical morphemes may not appear segmentally in deep structures, that is, the terminal elements of deep structures may only be lexical items" (Lakoff 1965 [1970]:xii). In opposition to that claim, various studies have shown that, in certain languages, such categories as prepositions, for example, are completely indispensable in the deep structure. O. Awobuluyi has tried to establish that "Yoruba prepositions are not syntactically predictable, nor are they a subclass or transformational derivatives of any other lexical category in the language". (Awobuluyi 1971:101).

It is true that, before positing prepositions or postpositions in African languages, the European (or Europeanized African) linguist has to ask himself whether he is influenced by a European language or not. Welmers might be right in claiming that "In Niger-Congo languages, there are very few words which can properly be called prepositions" (Welmers 1973:452). However, there are languages in Central Africa in which prepositions, as in Yoruba, must be posited in the deep structure. This amounts to saying that in Mbum, for example, we do not have the same situation as in Kpelle, where the postposition-like relationship "is not inherent in the relational noun at all, but rather in the position of the noun-phrase after the verb" (Welmers 1973:217). (I do not take into account here, since it is irrelevant to the present discussion, the fact that Mbum is prepositional and Kpelle postpositional). Let us note, by the way, that this wording is consistent with a current conception, according to which position is a surface structure characteristic. Several reservations could be made thereupon. But it is not my purpose to discuss this topic here. What I am concerned with is the following: putting aside the Fulani loanwords cited above (see 2.1), we have the following set of terms:

kà	'with'	ɓí	'in'
bá	'like'	ɓè	'because of'
fôl	'in front of'	fàl	'behind'
ɓîl	'inside'	ɓêl	'beside'
ŋgêr	'above'	tìbà	'below'

(Hagège 1971:267)

These terms are used in sentences like

ké jí kà mí wà 'he has come with me'
he come with me perf.

or

mì ɗûk ɓè ké wà 'I escaped because of him'
I escape because of him perf.

Moreover, these terms share the following features: (a) no existing nominal corresponds to the first three (kà, ɓí and bá). For the other terms, the corresponding nominals (names of body parts here as elsewhere in Africa, America, etc.) are extremely rare in contemporary usage. (b) the connective à is necessary as a possession marker:

Ex. sǫ́ạ̀ à gáŋàlúkú 'the chief's head'
head of chief

vòk à nzùk feet of man	'the man's feet'

but it never occurs after the terms of the above list. (c) this list is (synchronically)closed. (d) in a given text, the frequency of the above terms is six times higher than that of nominals.

Taking these features into account, it does not seem possible to assert that the above terms are nouns. I suggest treating them as prepositions (Hagège 1971:269) and state that no supposedly universal theory of grammar which rejects prepositions from deep structure permits full justice to be done to sentence structures of Mbum and languages of a similar or comparable type.

4.2. Relative clause, center-embedding and comprehensibility. In Kuno (1974:118), it is contended that there are "no languages that regularly mark embedded clauses in both clause-initial and clause-final position".

This universal feature, related to Greenberg's universals 3, 4, 12, 17 and 24 concerning the positions of S, O and V in regard to one another, is based on the assumption that "languages will embody devices to minimize those patterns that cause perceptual difficulties." (Kuno 1974:118). Thus a language which would use one grammatical word at the beginning and another at the end of an embedded clause "would impose an intolerable burden on the memory of the speakers." (Kuno 1974:128).

Consistent with this is Kuno's claim that "combinations of postpositions and postnominal positioning of attributives" (as well as combinations of "prepositions and prenominal positioning of attributives") are avoided becuase they "would produce a hopeless situation of center-embedding and juxtaposition of postpositions" (or an "equally hopeless situation of center-embedding and juxtapositions of prepositions") (Kuno 1974:128). Consequently, if a VSO language, instead of being prepositional, is postpositional, the English phrase "the color of the flowers in the vase on the table" becomes

color [flowers [vase [table on] in] of]

It happens that Mbum and Ngbaka on the one hand, Moru and Mangbetu (Central Sudanic) on the other hand provide counter-evidence to these contentions. Mbum has double marking of relative clauses by two deictics:

es.	ṵ́ḭ̀ woman	àí	mì I	zàŋzáŋ met	nú	bèlbél be beautiful	'The woman I have met is beautiful' (Hagège 1971:334)

It is not possible to use àí at the beginning without nú at the end (or conversely). The same thing is found in Ngbaka: a double deictic, nɛ̀...nɛ̀, encloses the relative clause. Since the two elements necessarily occur together, we should consider them, in both languages, as a unique discontinuous morpheme. It is true that discontinuity might constitute an obstacle to an easy comprehension when a very long stretch is embedded between the two elements of a discontinuous unity,[9] but this does not seem to bother Mbum speakers. It could be claimed that the capacity of temporary memory is not the same for speakers of a language with a writing tradition and speakers of what I prefer calling an oral language (instead of a privative designation such as "language without a writing tradition"): the sociolinguistic conditions of language use might have on the mnemonic training of the latter an effect deserving serious investigations, in particular with regard to its relationship with linguistic structure. If, waiting for the results of such investigations, we look for another explanation, we must observe that the double marking of a subordinate clause by a discontinuous morpheme does not have the same results according to whether it is a relative clause or not. What happens in Mbum or Ngbaka is parallel with the well-known facts of pronoun-retaining languages, such as Hebrew, Arabic, Persian, Welsh, Batak (*"the man whom I know him" type). In these pronoun-retaining languages, a situation comparable to central embedding seems quite natural (see Hagège, forthcoming d). In Hebrew, for example, we have

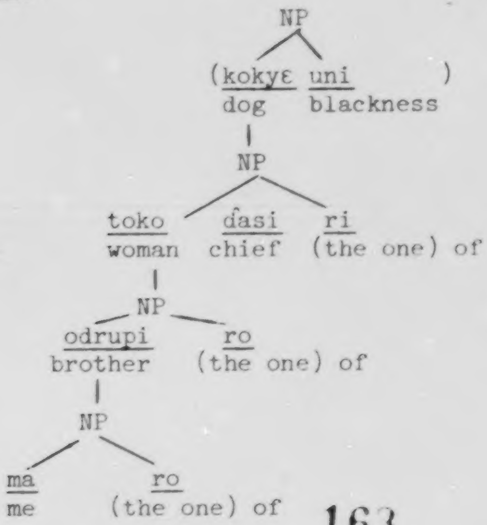
ha	yeled	ʃe	ani	makir	oto	'The child I know'
the	child	that	I	know	him	

To come now to the second aspect of the problem, in Moru, according to Tucker (1940:165) we find such structures as

kokyɛ	uni	toko	ɗasi	odrupi	ma	ro	ro	ri	[dra-te]
dog	blackness	woman	chief	brother	me	of	of	of	[is dead]
		A		B	C	c	b	a	

(tones not noted)
'The black dog of the chief woman of my brother is dead'

Considering that kokyɛ uni 'black dog' is not connected with a higher node, we have an inverted relationship between two nouns and one personal pronoun on the one hand, and three postpositions on the other hand: A B C c b a. We can represent this situation in the following diagram:



But instead of *_koykɛ uni toko ɗasi ri odrupi ro ma ro_, what we have is an embedding of each new NP between the dominating NP and the postposition, so that all postpositions are juxtaposed to the end. Even considering that _ri_ and _ro_ are, rather than postpositions, combinations of a connective with class markers in gender concord (human vs. animal) with the nouns, as is suggested in the translation given in the tree, we must admit that the Moru structure is a violation of Kuno's universal, and therefore produces a "hopeless situation of center-embedding and juxtaposition of postpositions". The same hopelessness applies to another unfortunate Central Sudanic language, Mangbetu, which presents the same structure (Larochette 1958:81 ff.).

Such a situation does not drive Moru and Mangbetu speakers to despair. It is more likely that linguists, who are speakers of a given language, are influenced by a logic unconsciously drawn from the structures of this language when they judge which linguistic situations are hopeless and which ones are not. However, I recognize that the structure illustrated by Moru and Mangbetu is, as far as I know, not particularly frequent. Consequently, there remain two possibilities: either we state that near-universals having to do with the intuitively felt limitations of the human capacity of temporary memory are more or less likely, although as yet no scientific study has been done concerning speakers of oral languages; or we admit that even for speakers of languages with a writing tradition, we do not know enough about perceptual difficulties and the process of comprehension. In the latter case, we had better wait for more information and renounce universal statements as long as they are based only on a preconceived idea of logical structures, suggested to us by the data of the languages with which we are familiar.

Footnotes

*I am indebted to Mrs. J. Modigliani-Brooks for her comments on the style of an earlier draft of this paper. The field research on which it is partially based was supported and made possible through grants of the ER 74 du C.N.R.S. Paris, whose contribution is gratefully acknowledged. Many of the Africanists whose works are cited here belong to the same ER (Equipe de Recherche).

[1] Another type of relatively rare phoneme is characteristic of several languages in the area, the labiodental vlap _V_, found in Mundang, Tuburi, Mɓum, Banda, Manza, Duru: the lower lip flaps forward after having been placed behind the upper teeth.

[2] A different analysis has been proposed in Rygaloff (1973:50), reducing the number of tonemes by the choice of two relevant features: length and level.

[3] Banda also has reduplication of verb-stem as a process to express negation. Reduplication is very widely used in the languages of this area, though perhaps not as much as in Hausa and other Chadic languages. Mɓum and Mundang have reduplications of

various types corresponding to various verbal aspects. One might compare this to the reduplication processes abundantly found in Snohomish and other Salishan languages, which exhibit a "chameleon morphology", according to Hess (1966), who borrows the term from Hockett.

[4] In Irish, the opposition that is found within stops, fricatives and sonants as well, is the one between voiced and unvoiced (C.H.).

[5] Wolof of Sine Saloum has, likewise, a fortes-lenes opposition within stops, semi-nasals and nasals (according to Hedger 1973). Note also that some Salishan languages, such as Thompson (studied by L. Thompson) and Kalispel (studied by H. Vogt) have the same oppositions as Mundang.

[6] On this problem, see Haudricourt (1970).

[7] The Mbum name of this sensitive plant is due to the fact that its leaves retract at the first raindrop, like a mother's arms to protect her children against a danger.

[8] Similar facts are found in other Central African languages, such as Banda, Ngbaka and Yakoma (see Cloarec-Heiss 1969:62 and 66). Many other language families all over the world have that too, e.g. Melanesian (for Wojokeso, see D. West 1973:28-29).

[9] In certain cases of discontinuity, the second element of the embedding phrase is merely chopped away: e.g., in some dialects of American English, the common usage today, in expressions such as "as far as X is concerned", is to omit the "is concerned" if X is (deemed) too long: "I'm not at all sure as far as my future" (quotation from a sports figure in the newspaper, according to Wm. E. Welmers, whom I thank for providing this example).

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Proceedings of the Sixth Conference on
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The Study of Word Order in African Languages*

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1. Introduction

Probably the first systematic treatment of word order in African languages was that of Wilhelm Schmidt (1926) who conducted a comparative survey on certain grammatical phenomena. Joseph Greenberg summarizes Schmidt's findings thus: "Prepositions go with nominative-genitive order and postpositions with the reverse order. The nominative-genitive order tends to appear with verb before nominal object and genitive-nominative with object-verb. ...Further, nominative-genitive is associated with noun-adjective and genitive-nominative with adjective-noun." (Greenberg 1963:83).

But the comparative study of word order in African languages started much earlier, dating back to the 19th century. Unfortunately, it was allocated to genetic, rather than to typological linguistics. Many of the shortcomings of early comparative linguistics in Africa can be ascribed to a confusion of genetic and typological phenomena, and word order has been one of the most frequently used typological criteria.

In his noteworthy classification of African languages, Richard Lepsius (1880) distinguished two original language families, namely Bantu and "Hamitic". These families, he claimed, differ in twelve main points, six of which relate to the order of meaningful units (1880:XX-XXXII).

The work of Lepsius has had a strong impact on subsequent generations of Africanists. Most scholars who have come out with studies in language classification have used word order in order to determine genetic groupings. Carl Meinhof noted that the genitive precedes its governing noun in the "Sudanic" family of languages whereas it usually follows in "Hamitic". "Hamitic" languages which, nevertheless, have the opposite order are considered mixed languages (Meinhof 1910:93-94). Johannes Lukas, too, mentions the position of the genitive after its governing noun as one of the definitional criteria of "Hamitic" languages (1938:234).

Diedrich Westermann distinguished two basic types of African languages depending on the order of nominative and genitive. According to him, Bushman, Hottentot, and predominantly, "Sudanic" place the genitive in front of the governing noun while Bantu and "Hamitic" have the reverse order. Within the "Sudanic" family he finds a sub-class of languages in which the object precedes the verb. This sub-class, which includes Songhai, Mande, Ijaw, Kanuri, Fur, Nubian, Kunama, and Barea, is said to reflect an older stage of word order (Westermann 1949:14). The *Handbook of African Languages* series offers a wealth of data on word order phenomena but does not attempt a systematic treatment of it. The order of meaningful units is used as one of the criteria in language classification. Thus, the fact that "Nilo-Hamitic" has verb-subject-object order is part of the evidence adduced to separate "Nilo-Hamitic" from "Nilotic" (Tucker and Bryan 1957:149-150), and one of the main criteria in distinguishing between Hottentot-Sandawe and Bushman-Hadza within Khoisan is again the order of sentence constituents which is said to be subject-object-verb in Hottentot but subject-verb-object in Bushman (Westphal 1956:166-167).

In his survey of dependency-word order structures among the languages of the world, Lucien Tesnière (1959:22-33) also includes African language groups. Tesnière's typology rests on the distinction centrifugal/centripetal. Centrifugal languages place the dependent element behind the head, whereas centripetal languages have the opposite order. The African languages, Tesnière concludes, are centrifugal, with the exception of South-African Bushman and Hottentot, which are said to be centripetal. In spite of its theoretical significance, Tesnière's work suffers from oversimplification which is due to his relying on insufficient second-hand material on African languages.

More recently, Maurice Houis (1970) has attempted a strictly typological classification of African languages. Houis correlates phonological and morphological features with word order and distinguishes two main types: one that has nominative-genitive, noun-adjective order, prepositions, as well as both closed and open syllables, complex word structure, rich morphology, etc., but lacks a phonemic contrast between oral and nasal vowels. This type is found in West Atlantic languages like Fulani, Temne, Diola, Wolof, Serer, Konyagi and Bassari, in Hausa, Bantu languages, as well as in Nilotic languages like Acholi and Kalenjin. The second type has genitive-nominative order, postpositions, only open syllables, simple word structure, a poor morphology but a productive pattern of nominal compounding, as well as distinct nasal vowels. The languages of the Mande, Gur and Kwa groups of the Niger Congo family are said to belong to this type.

The following year, Houis (1971) published a revised version of this typology. The criteria used remain basically the same but the number of types is now increased to five.

Earlier, Joseph Greenberg (1963) had presented a paper entitled "Some universals of grammar with particular reference to the order of meaningful elements", which marked a new era in the study of word order. Whereas Houis considers mainly the order of the noun phrase, Greenberg takes the sentence constituents as the basis of typological comparisons. He distinguishes three common types of languages depending on whether the verb stands before (type I), between (II), or after (III) the subject and object. Greenberg's world-wide sample of 30 languages includes seven African languages which are Berber, Fulani, Maasai, Nubian, Songhai, Swahili, and Yoruba.

Greenberg's article appears to have had a much greater impact in the field of language typology than in that of language universals. His classification has been widely accepted, and some linguists would go so far as to assume that it reflects an inherent principle of human language in the same way as 19th century linguists claimed for the distinction between isolating, agglutinational and inflectional languages in the area of morphological typology.

Some linguists argue that Greenberg's classification can be reduced to two types. According to James McCawley, for example, "...there are basically only two word-order types, verb-initial and verb-final; other surface word order types arise from one or the other of these through transformations" (McCawley 1970:298). He considers the order subject-verb-object of English as superficial and claims that it arises by a transformation from an underlying constituent structure in which clauses begin with verbs. Winfred Lehmann maintains that the relative order of the verb and object is fundamental in establishing other orders of syntactic arrangement, and he therefore distinguishes two main types depending on whether the object follows ("VO languages") or precedes ("OV languages") the verb. VO languages are likely to use prepositions and to place the adjective behind the noun, whereas OV languages are likely to use postpositions and to have adjective-noun order. French, Spanish and Bantu are said to be consistent VO languages; Turkish, Japanese being examples of consistent OV languages (Lehmann 1972:267-268).

Other scholars again have increased the number of types to four. Emmon Bach, for example, adds another type which he calls "free word-order languages" (1970:9). Theo Vennemann distinguishes a fourth type which he refers to as "TVX". Unlike SVO (type II) languages, TVX languages do not only place the subject before the verb--other topical elements may as well precede the finite verb. German is given as an example of a TVX language (Vennemann 1973). L. Dezsö (1970:552) adds a fourth type (VOS) which has basic object-subject order and subject-verb-object as a variant order. Malgash is given as an example of such languages. John Ross (1970) has demonstrated that there exists some significant correlation between Greenberg's types and certain syntactic phenomena; the gapping of SVO languages (if there exists such a pattern[1]) is always to the right whereas SOV languages either gap to the right (= Forward Gapping) and to the left (= Backward Gapping), or only to the left. The so-called "free-word-order languages" like Latin and Russian are said to have no restrictions in gapping patterns.

The relevance of word order typology has been demonstrated especially in diachronic linguistics. Winfred Lehmann (1971:23) has come out with a number of conclusions concerning syntactic developments in Indo-European languages. Li and Thompson (1973) have given an interesting account of typological changes in Chinese resulting from a re-analysis of verbs as prepositions and an interrelated change from serializing to non-serializing verb constructions. Talmy Givón (1974) attempts to prove that Proto-Niger-Congo was an SOV language although the vast majority of the 500-odd Niger-Congo languages spoken today are SVO. Heine (1975) has shown that word order typology is particularly relevant to areal (Sprachbund) linguistics.

In spite of the remarkable progress that has been made in the analysis of word order since 1963, there are some fundamental questions that have not yet been looked into satisfactorily, if at all. For example, what are the guidelines for choosing criteria when one wants to group languages to types? Different criteria have been proposed each leading to different typologies, but usually no explanation is given to justify the choice made.

The discussion that has taken place concerning the position of Amharic, the national language of Ethiopia, reveals another problem of word order typology. Amharic, like all other Ethiopian Semitic languages, places the verb at the end of the sentence and Greenberg therefore classifies it as SOV (type III). Emmon Bach (1970), on the other hand, claims that Amharic is only superficially SOV, its underlying constituent order being VSO. Grover Hudson (1972:128) again comes to the conclusion that a grammar which posits an SOV deep structure for Amharic is superior by the criterion of naturalness. The problem underlying the Amharic controversy is partly due to differences in the theoretical frameworks used by the various authors. But, more importantly, it seems to be rooted in the fact that the relevance of the types distinguished by Greenberg and others (including ourselves) has been misunderstood by some scholars. Greenberg's SOV type, for example, includes a wide range of languages, some of which, like Iraqw and Galla in Eastern Africa, have more features in common with SVO than with other SOV languages. Amharic, too, differs remarkably from other SOV languages like Sidamo, Kxoe, or Japanese, which one is tempted to call "rigid" or "consistent" SOV languages. One has always to keep in mind that any attempt at devising typologies remains arbitrary to some extent, and that one is equally justified to arrange languages along a continuum rather than grouping them into types.

Another problem concerns the relationship between word order and grammatical models. Arthur Schwartz (1972) for example suggests that word order typology may force us to reconsider the basis of constituent structure. In comparing accusative, accusative-ergative, and ergative language systems, he concludes that the basic types distinguished by Greenberg (VSO, SVO, and SOV) differ in their constituent structure in that SVO systems have a VP constituent (= V + NP) whereas VSO and SOV systems have not. The various types are said to differ in their degree of markedness: VSO and SOV are clearly marked systems, whereas SVO is not, or, at least, less marked.

The purpose of the present notes is to compare patterns of word order occurring in African langauges with a view to study the interrelationship between the various patterns, and to devise a typology of African languages. Our sample includes over 300 languages from all parts of the continent. The linguistic data are mostly taken from published works. In some 25 cases it was possible to use our own field notes.

The choice of parameters is largely dictated by the availability of comparative data from as many languages as possible. Preferably, criteria are being used which have proved useful both in connection with typological and with implicational statements. Altogether 33 parameters relating to various grammatical phenomena have been selected.[2]

Applying these criteria to African or any other languages brings about a number of problems some of which are briefly discussed below.

The first problem concerns the universal validity of notions such as 'subject', 'preposition', 'noun', or 'adverb'. For example, there are said to be African languages which have no genuine prepositions or postpositions, which lack adjectives as a morphological category, or which do not distinguish between verbs and nouns. It probably would be an almost impossible task to find adequate cross-linguistic definitions for the morphological and syntactic classes mentioned, applying to all African languages. In spite of this problem, which we do not want to underestimate, relatively few difficulties are encountered when trying to equate such categories in different languages if one assumes that there is some underlying structure whose relevance can be demonstrated by means of both semantic and syntactic tests.

Another problem relates to the significance that the linear arrangement of meaningful elements may have. Our comparisons will result in statements like "Word order A in one language corresponds to order B in another". But these word orders may be of quite a different nature. Usually, three kinds of word order are distinguished: invariable, freely variable, and contrastively variable order. Thus, it will happen that we compare the invariable order of one language with the freely or contrastively variable order of another. Although we do not know exactly how far this may affect our results it seems that this problem is not of crucial importance to our analysis as we restrict our comparisons to what Greenberg calls "basic" or "dominant" order (1963:60 ff.).

The definition of "basic word order" poses perhaps the biggest problem that we have to face. We may say that of all forms of linear arrangement, basic order is the least marked: it has usually the highest text frequency, it tends to be used in positions of neutralization and to have the smallest amount of morphological complexity. Although in the majority of cases no problems are encountered as to which of the alternatives occurring has to be considered basic there remain a number of cases where no clear answer seems possible. Such cases are particularly frequent in languages which rely heavily on a communicatively determined, rather than on the grammatically conditioned, principle of linear arrangement.

A clear-cut decision as to which of the alternatives occurring is to be considered basic does not seem possible for example in a number of African languages which have variable word order in accordance with the aspectual distinction [±definite]. Tucker's (1940) description of the situation in Moru-Madi of Central Sudanic is, mutatis mutandis, characteristic of a larger class of languages:

> "The most important feature in Moru-Madi verb conjugation is Aspect. There are two aspects, and the position of the verb forms in the word order of the sentence is indicative of the aspect of the action described by the verb. Thus:
>
> 1. Word order = Subject + verb + object: the verb action is complete, momentary, 'perfect', DEFINITE.

2. Word order = Subject + object + verb: the verb action is incomplete, progressive, 'imperfect', INDEFINITE." (Tucker 1940:180)

That the aspect is responsible for the respective word order can be seen from the following example taken from Lendu, another Central Sudanic language (Tucker 1940:402):

Indefinite	má ʼou ʼá (I chicken eat)	'I am eating a chicken'
Definite	má ʼa ʼou̍	'I have eaten a chicken'

A similar distinction is found in Dahalo ("Sanye"), a Southern Cushitic language of the Kenya coast. This language has S-O-V order in the Present-Future and S-V-O in the Past-Perfect.

2. Dominance

A comparison of word order in different languages suggests that there exists some hierarchical relationship between alternative orders. This relationship can, with more or less justification, be expressed by means of dichotomies such as dominant/recessive, unmarked/marked, basic/derived, and perhaps even universal/particular. For the present discussion, the terms 'dominant' and 'recessive', as introduced by Greenberg[3] (1963:76), are chosen.[4]

Word order relationships between languages will therefore be described in terms of statements like "The morpheme or word order X-Y in language A is dominant over the opposite order Y-X in language B".

It is not always possible to decide unambiguously whether a given word order is dominant or recessive, and in some cases the dichotomy even appears to be irrelevant altogether. In most cases, however, there are no difficulties encountered in establishing this distinction. The main criteria are:

(1) Statistical occurrence. Dominant order usually, although not necessarily, turns out to be statistically clearly predominant. Looking at the frequency of occurrence of the basic word order phenomena, we find that among the 300-odd African languages of our sample:

95%	have the order S-V (subject-verb) in 'intransitive' sentences;
71%	have S-V-O (subject-verb-object), as opposed to 5% having V-S-O, and 24% having S-O-V;
63%	have Oi-Od (indirect object-direct object);
87%	have S-V-AP (AP = adverbial phrase), as opposed to 5% having V-S-AP, and 8% having S-AP-V;
62%	have nominative-genitive;
59%	use prepositions rather than postpositions;
88%	have noun-adjective;
91%	have noun-numeral;
91%	have noun-indefinite adjective;
82%	have noun-interrogative adjective;
70%	have noun-possessive adjective;

85% have noun-demonstrative adjective;
65% have adjective-demonstrative;
96% have possessive-adjective;
96% have adjective-adverb;
93% have verb-adverb;
94% have subject pronoun-verb;
63% have verb-object pronoun;
83% have tense marker-verb;
68% have negative-verb;
96% have subject pronoun-object pronoun;
93% have subject pronoun-tense marker;
76% have subject pronoun-negative;
92% have tense marker-object pronoun.

Given any unknown African language one can therefore predict with a certain degree of probability that in this language the subject precedes the verb (and the object), that nominal qualifiers like adjectives, numerals or demonstratives follow the noun, and so on.

(2) Predicative factors. While Greenberg (1963:76) questions the importance of frequency of occurrence, he considers what he calls "the logical factor of a zero in the tetrachoric table" as a basic prerequisite for a definition of the notion of dominance. There are certain word orders which seem to be mutually exclusive, whereas other orders are always found to co-occur within a given language. The general rule is that recessive word order only occurs under specified conditions, while dominant order is not subject to such limitations.

Note, however, that Greenberg's sample of languages is relatively small. This is significant in so far as some of the "zeroes" in his tables will disappear as soon as a larger sample is chosen, and some predicative statements of the type "a language having word order X does not have word order Y" may turn out to have to be replaced by quantitative statements of the type "there is a low probability that a language having word order X also has Y".[5]

Greenberg's findings can be summarized thus: the dominant type SVO occurs without limitations whereas the recessive types VSO and SOV show limitations of the following kind: (a) VSO does neither occur with postpositions nor with adjective-noun order; SOV, on the other hand, is said to be absent in prepositional languages (Table 1). (b) In VSO languages, the auxiliary does not follow the verb, whereas in SOV languages it does not precede the verb (Table 4). (c) In comparisons expressing superiority, VSO languages have the order adjective-marker-standard, whereas SOV languages have the opposite order. In SVO languages, either or both orders may occur, although adjective-marker-standard seems to be predominant (Table 8). (d) In constructions of nominal apposition, the order Proper Noun-Common Noun does not occur in VSO languages, whereas Common Noun-Proper Noun is not found in SOV languages (Table 9). (e) Exclusively prefixing languages are of the SVO type only. Furthermore, there are no exclusively suffixing VSO languages (Table 11).

Other findings of Greenberg relate to the order of nouns and their dependent adjectives: the recessive order adjective-noun is subject to a number of limitations of occurrence which the dominant order noun-adjective is not, e.g.: (f) The order noun-demonstrative is not found if the adjective precedes the noun, and the same applies to noun-numeral. Such restrictions do not exist with the dominant order noun-adjective (Table 6). (g) Adjectival qualifiers precede the adjective in adjective-noun languages. In languages with basic noun-adjective order, these qualifiers may precede, follow, or both (Table 7).

(3) Other grammatical phenomena. It seems that evidence for establishing the distinction dominant/recessive can also be found outside word order relations. Our analysis of African languages suggests that the recessive types VSO and SOV, when correlated with certain grammatical phenomena, show some limitations in occurrence not shared by the dominant SVO type. For example, languages lacking productive verbal derivative affixes for causative, intransitive and passive belong to Greenberg's SVO type throughout. No VSO or SOV language has been found which does not have at least one of these morphemes. Those languages of our sample which lack these three derivative morphemes have the following orders, all of which are dominant:

S-V-AP
Noun-numeral
adjective-demonstrative
possessive-adjective
adjective-adverb
verb-adverb
subject pronoun-verb
subject pronoun-object pronoun
subject pronoun-tense marker
subject pronoun-negative

A possible counter-example is provided by Arthur Schwartz (1972: 220) in his comparative analysis of verb phrases. Schwartz discovered that true ergative systems are found in both VSO (Chinook, Niuean) and in SOV languages (Basque, Dyirbal), but not in SVO languages. Thus, the dominant type shows limitations which the recessive types do not. According to the explanation given by Schwartz, however, it is exactly the recessive ("marked") nature of VSO and SOV languages that enables the development of ergative structures, due to the detached status of the predicate in these languages. This development is blocked in SVO languages for which Schwartz claims a different constituent structure with a strict predicate-complement relation[6] (1972:230-234).

(4) Non-basic variants. A number of languages allow for alternative orders of the sentence constituents subject, verb and object in accordance with thematic, modal, or other distinctions. Greenberg (1963:63; Universal 6) states that languages with basic V-S-O order have S-V-O as an alternative or as the only basic alternative. Generalizations of this kind do not seem possible for the other two types; yet, the following holds for quite a number of languages: consistent SOV languages do not have V-S-O as an alternative,[7] nor do VSO languages have S-O-V. Languages of the dominant SVO type, on the other hand, are not subject to this limitation.

Another kind of generalization relates to the order of the noun and its qualifying adjective and has been described by Greenberg (1963:68; Universal 19) thus:

> "When the general rule is that the descriptive adjective follows, there may be a minority of adjectives which usually precede, but when the general rule is that descriptive adjectives precede, there are no exceptions."

Here again, the recessive order (adjective-noun) shows limitations in that it does not tolerate an alternative order, whereas the dominant order (noun-adjective) is free from such limitations.[8]

In the previous section, the terms 'dominant' and 'recessive' have been used primarily with reference to individual features of languages. If a language can be said to be of the 'dominant type' then it is one which has no or hardly any recessive word order.[9] Such a language must possess the following patterns of basic word order: (a) the subject precedes the verb; both indirect and direct object follow the verb, and so do adverbs and adverbial phrases; (b) prepositions, rather than postpositions, are used; (c) nominal qualifiers or modifiers follow the noun. The constituents involved are: (i) possessives, both nominal (genitive) and pronominal; (ii) determiners such as demonstratives and definite/indefinite articles; (iii) adjectival constituents, including numerals as well as indefinite and interrogative adjectives; (d) the order of nominal qualifiers is possessive adjective-adjective-demonstrative; (e) adjectival qualifiers (e.g. "very") follow the adjective; (f) within the verbal group, only the object pronoun follows the verb; subject pronoun, tense/aspect markers, and the negative particle precede the verb. The order is

$$\begin{array}{c}\text{subject}\\ \text{pronoun}\end{array} - \left\{\begin{array}{c}\text{tense/aspect}\\ \text{negative}\end{array}\right\} - \text{verb} - \begin{array}{c}\text{object}\\ \text{pronoun}\end{array}$$

(g) auxiliary verbs precede the main verb; (h) relative clauses follow the noun on which they depend; the relative pronoun, if there is any, heads the relative clause; (i) if there exists a gapping pattern, then it is only Forward gapping.

3. Typology

The area where word order studies have made a particular impact on linguistics is typology. Since Greenberg's classification into VSO, SVO and SOV languages, word order typology has become a much discussed subject in comparative linguistics.

A number of scholars seem to assume that typology on the basis of word order differences is founded on some easily detectable language-inherent principle--a view that reminds one of the naïveness of 19th century morphological typologists. Our survey of African languages suggests that word order typology is perhaps as complicated a field as morphological typology has turned out to be. The only thing that seems obvious at present is that languages form a continuum whose end points can be determined theoretically--say, a "consistent" or "strict" VSO language on one side and a "consistent/strict/rigid/" SOV language on the other. Any attempt at segmenting this continuum is to some extent *arbitrary*.

If, nevertheless, an effort is made to classify African languages then it is done mainly for descriptive and comparative convenience and is based on the observation that some word orders allow for more generalizations than others. Irrespective of how arbitrary the following typology may be, it is held that there exists some hierarchical realtionship linking the various languages and types. This relationship is based on the concept of dominance.

Type A. A *rigid* type A language would consist of dominant features only, i.e. could be described as having the following word order patterns: (1) the subject precedes the verb; (2) the object follows the verb and is itself followed by adverbial phrases; (3) prepositions and nominative-genitive order are used; (4) nominal qualifiers like adjective, numeral, possessive and demonstrative follow the noun; (5) the possessive adjective precedes the other adjectives; (6) the adverb follows the verb and the adjective; (7) the subject pronoun precedes all other constituents of the verbal group; (8) tense/aspect markers precede the verb; (9) the object pronoun follows the verb; (10) if there is a Gapping pattern then it is Forward gapping only.

A substantial number of African languages will be allocated to type A although they show one or the other deviation from the above patterns. In order to trace a clear-cut boundary between A and the other language types to be discussed below, a negative specification is necessary: the basic word order of type A languages is such that: (a) the verb does not precede the subject; (b) the adverbial phrase does not precede the verb; (c) genitive-nominative order and postpositions do not both occur.

Type A languages are found in all African language families. North African Afro-Asiatic A languages are Egyptian Colloquial Arabic, Shuwa Arabic of Bornu, Coptic. Most, if not all Chadic languages are of type A. The only Cushitic languages of this type are Yaaku (Mogogodo) and Mbugu (Ma'a).

Kordofanian A languages are Koalib, Talodi, Krongo, Katcha and Katla. A is also the clearly predominant type within Niger-Congo, although it does neither occur in the Mande nor in the Gur branch. More or less all West Atlantic languages and most Eastern Kwa languages are A. In our sample, there are only two Benue-Congo languages which are not A, namely Reshe, a Plateau language, and Nen (Tunen) of the Bantu group. Most, if not all, Adamawa-Eastern languages also belong to type A.

There are relatively few Nilo-Saharan type A languages. Gule, Central Sudanic languages like Bongo, Sara, and Bagirmi, Eastern Sudanic languages like Tabi (Ingassana), Temein, the whole of Western Nilotic, Bari of Eastern Nilotic and Dadog of Southern Nilogic belong here.

Khoisan type A languages are /xam-ka-!'e, "Eastern Bushman" and Batwa (of Lake Chrissie).

Type B. Languages of this type place the genitive before the governing noun and use postpositions rather than prepositions. The same orders are found in many type D languages (see below), where they are, however, a concomitant rather than a definitional feature. The decisive difference between the two types is that in D languages the verb follows whereas in B languages it precedes the adverbial phrase. A concomitant feature of B languages is that the possessive adjective usually precedes the noun.

In addition, B languages have the following characteristics, all of which are dominant: (1) nominal qualifiers like adjective and numeral follow the noun; (2) the adjective usually precedes the demonstrative and the numeral; (3) the adverb follows the adjective and usually also the verb; (4) the subject pronoun precedes the tense/aspect markers, the verb, and the object pronoun.

Grammatical characteristics of type B languages are: (5) a "genuine" passive construction does not exist; (6) there is no grammatical category of dual; (7) no B language has a noun gender system based on the distinction masculine/feminine.

Apart from one sub-type (MANDING: see below), B languages have S-V-O as their basic order. Frequently, however, there is one non-basic alternative which has S-O-V.

More or less all Western and Central Kwa languages of Niger-Congo, all Togo Remnant, and all Gur (Voltaic) languages are B. This type is also found in all languages of the Mande branch, in Reshe of Plateau, Nen of Bantu, and in Tumale and Tagoi of Kordofanian. Within Nilo-Saharan, B languages are Mangbetu, Balese, and Mamvu of Central Sudanic, as well as all languages/dialects of the Songhai cluster. Khoisan languages of type B are !Xu, Dzu/'oasi, ≠unkwe, and /Xam.

The Central Sudanic languages Moru, Avukaya, Keliko, Logo, Madi, Lendu, and Lugbara are marginally type B.

Type C. Languages of type C are those that have verb-subject as their basic order. In addition, these languages have the following characteristics: (1) other constituents like object and adverbial phrase likewise follow the verb; (2) there is at least one alternative to the basic order V-S-O which is S-V-O (cf. Greenberg 1963: 63); (3) if a gapping pattern exists then it is only Forward gapping; (4) nominative-genitive order and prepositions are used; (5) adjectives, numerals, and possessives usually follow their head noun; (6) possessive adjectives precede the other adjectives; (7) the verb precedes the adverb although there is usually a non-basic alternative to place the adverb in sentence-initial position; (8) auxiliary verbs precede the main verb; (9) the negative marker precedes the subject pronoun and the verb; (10) the object pronoun does not precede the tense/aspect markers or the verb.

Furthermore, African type C languages seem to have some common grammatical features: (11) there is at least one verbal derivative, expressing either causative or intransitive; (12) number is distinguished obligatorily with nouns; (13) if there is a noun gender system then it is based on the distinction masculine/feminine.

African type C languages are largely confined to Northeastern Africa and to the Eastern Sudanic group of Nilo-Saharan. Within this group, it occurs in Diding'a-Murle, in all Kuliak languages (Ik, Tepes, Nyang'i), in Southern Nilotic except Dadog, and in Eastern Nilotic except Bari. Outside the Eastern Sudanic group, the only African type C language so far found is Hadzapi, a Tanzanian Khoisan language, but the extinct Middle Egyptian also belonged [illegible] this type.

The Berber cluster of North Africa has been classified by Greenberg as VSO, i.e. as satisfying the definition of a type C language. This view, which seems to be shared by André Basset, is not quite corroborated by our own evidence, mainly because of the following reasons: (a) an analysis of texts shows that the order subject-verb is statistically clearly predominant, (b) the verb can be placed sentence-initially, between subject and object, and also sentence-finally--a feature that is typical of some type A languages but uncommon in C, (c) there are some word orders in Berber that are rather divergent from the patterns found in C languages, e.g. the order numeral-noun.

Berber is therefore classified basically as type A, being located near the boundary of A and C.

Type D. Type D languages are defined as placing the adverbial phrase before the verb. This implies that the nominal object likewise precedes the verb.

In addition, type D languages usually have the following features: (1) the auxiliary follows the main verb; (2) words marking sentence questions precede the verb; (3) there is either an optional or an obligatory Backward gapping pattern; (4) if there are nominal gender affixes then they are suffixed to the noun.

In addition, type D languages are characterized by a tendency to replace all dominant word order by recessive order.

Type D is particularly widespread in Northeastern Africa. All Ethiopian Semitic languages and most Cushitic and Omotic languages are D. Nilo-Saharan D languages are Kanuri, Kanembu, Tubu, Sungor, Mararit, Maba, Fur, all Nubian languages, Kunama, Barea, Nyimang, and others. A Kordofanian D language is Tegali. Niger-Congo languages of type D are Sigi, a secret language of the Dogon, and the languages of the Ijo (Ijaw) cluster. All Central Khoisan languages and Sandawe of Tanzania equally belong to D.

Iraqw, some languages of the Kru group (Newole, Koyo), and Lafofa and Masakin of Kordofainan seem to be marginally D.

The four basic types distinguished above can be sub-classified in a number of ways. In the following, we will group those languages together which show some significant deviations from the basic type, i.e. languages which possess certain recessive features not shared by other languages of that type.

Sub-types of A: BANDA, BANTU and DUALA

BANDA type languages differ from other A languages essentially in placing the adjective before the noun.[10] Languages of this type are mainly found in a geographically definable area north of River Congo within the Adamawa-Eastern branch of Niger-Congo. They are Mbaka-Limba, Mbum, languages of the Gbaya, Ngbandi, Banda and Zande groups, Ndogo, Bai, Bviri, Tagbu and Sere. Bamileke and Efik are Benue-Congo languages of the BANDA type which also includes Hausa.

The main characteristic of BANTU type languages is the position of the bound object pronoun, which precedes the verb. Most, but not all, Bantu languages belong to this type. The boundary between the languages of this type and the other Bantu languages coincides roughly with the genetic boundary between Branch 11 on the one hand and Branches 1-10 on the other (Heine 1973), i.e. almost all the 300-odd Branch 11 languages belong to the BANTU type. Languages which are not of this type are mainly found in the northwestern

Bantu area (Cameroon in particular). In addition, all Bantu pidgins are excluded. Non-Bantu languages of this type are Yaaku (Mogogodo) and Mbugu (Ma'a), two Cushitic languages which are spoken in the vicinity of Bantu languages, as well as Dinka, a Western Nilotic language, and Koalib, a Kordofanian language.

The prominent feature of the DUALA type is the position of the demonstrative adjective, which precedes the noun. Languages of this type are found among some northwestern Bantu languages, e.g. Duala, Bankon (Bo), Nyang (Kenyang), and Nkosi (Koose), Kulere of Chadic, Bari of Eastern Nilotic, Batwa, a Southern Khoisan language of Lake Chrissie, as well as Kukuruku, a Nigerian Kwa language, and Coptic.

Sub-types of B: MANDING and MORU

The MANDING sub-type may be called the "rigid type B". Languages of this type place both the nominal and the pronominal object before the verb. Furthermore, the possessive adjective almost always, and the demonstrative frequently preceded the governing noun, and the direct object is likely to precede the indirect object.

Some authors have suggested to allocate MANDING type languages to type D ("SOV"). According to our analysis, this is not justified, as type D languages place the adverbial phrase before the verb and differ fundamentally in their verbal syntax. All languages of the Mande branch of Niger-Congo belong to the MANDING type. In addition, there are some Gur languages, like Senufo, Bariba and Seme, Tumale and Tagoi of Kordofanian, as well as Nen (Tunen) of Bantu, and the Dyerma dialect of Songhai.

Of all B languages, MORU type languages are nearest to A. They differ from other B languages mainly in having both S-V-O and S-O-V as their basic order. Frequently, MORU type languages have both genitive-nominative and nominative-genitive order. Languages of this type are confined to a small area north of Lake Mobutu (Albert) in the watershed region between rivers Uele and Nile. They include Moru, Avukaya, Keliko, Logo, Madi, Lendu, and Lugbara, all of which belong to the Central Sudanic group of Nilo-Saharan.

Sub-type of C: MAASAI

This type differs from all other African type C languages in placing the demonstrative adjective before the noun. The only member of this type are the lects of the Maa cluster in East Africa, i.e. Samburu, Njemps and Maasai.

Sub-types of D: GALLA, KAFFA, AMHARIC

Languages of the GALLA type can be called "weak type D" languages. Apart from those characteristics which define them as D, there are very few recessive word orders. Whereas the use of post-positions is predominant in these languages, the genitive may precede or follow its governing noun. Nominal qualifiers like adjective, numeral, demonstrative and possessive usually follow the noun. If there are exceptions then they relate to single qualifiers, e.g. the numeral in Somali or the demonstrative in Nubian. Verb-tense marker is the only order or one of the basic orders and accordingly, the object pronoun usually precedes the tense marker.

A number of Nilo-Saharan languages are of the GALLA type, such as Kanuri, Tubu, Mararit, Sungor, Fur, Nyimang, Nubian, Kunama, and Barea, as well as some Cushitic languages like Somali and Galla.

The KAFFA sub-type may be called the "rigid" type D. Its characteristics are: nominal qualifiers precede the noun; postpositions rather than prepositions are used and the genitive precedes the nominative; infinitive phrases precede the governing verb (e.g. "he to come intends" = "he intends to come"); tense marker and negative particle usually follow the verb; the relative clause frequently precedes its governing noun, and Backward gapping is likely to be the only gapping pattern occurring.

Languages of this type are some Ijo dialects (e.g. Kolokuma), the Central Khoisan languages (Kxoe, Nama, Korana etc.), Sandawe, Gurage, an Ethiopian Semitic language, Cushitic languages like Burji, Sidamo, Kambatta, Hadya and Quemant, or Omotic languages like Kaffa, Ometo or Janjero.

The AMHARIC type is intermediate between the GALLA and the KAFFA types in that it contains more recessive features than the former but fewer than the latter. Main features of this type are: the numeral precedes but the possessive adjective follows the noun; the use of postpositions is predominant although prepositions may occur.

AMHARIC type languages are Bedauye, a Northern Cushitic language, as well as most Ethiopic Semitic languages like Ge'ez, Tigre, Tigrinya, Harari, and Amharic.

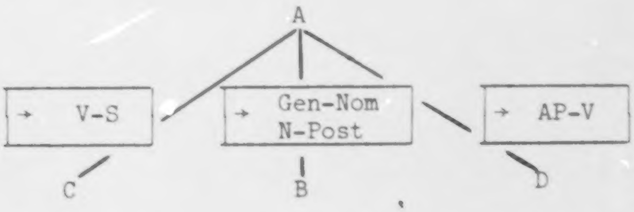
4. Dominance and dependency

When starting our survey, we had hoped to be able to adopt the Greenbergian word order classification which has come to be so widely accepted. But this classification turns out to be superficial in some cases in that, on the one hand, it separates typologically similar languages, and even dialects of the same language, but on the other hand, lumps together rather divergent structures. For example, there hardly seems to be any justification to allocate the Mande languages, which have S-O-V order, and the Gur, Togo Remnant, and Western Kwa languages, which have S-V-O order, to different basic types. The word order patterns of Mande again have little in common with those of S-O-V language groups like Omotic or Central Khoisan.

Our typology, however, does not seem to be very much different from that of Greenberg (1963), the main divergence lying in the choice of slightly different criteria which allow for more generalizations. If, nevertheless, there is a fundamental divergence then it concerns the concept of dominance and the relationship between the various types. The four basic types are linked to each other in a systematic way: they are all part of a hierarchical grouping in which one (type A) is at the top and the others are derived from it by means of a rule of the form

dominant → recessive

Thus, while the relationship between A on the one hand and B, C, and D on the other is characterized by a difference of one rule only, all other types are separated from each other by two rules, one rule deleting the recessive feature(s) and a second rule introducing a different recessive feature. The following diagram makes this clear:



In order to arrive from type C at D one needs the rules

(1) Delete S-V → V-S
(2) V-AP → AP-V

whereas only one rule

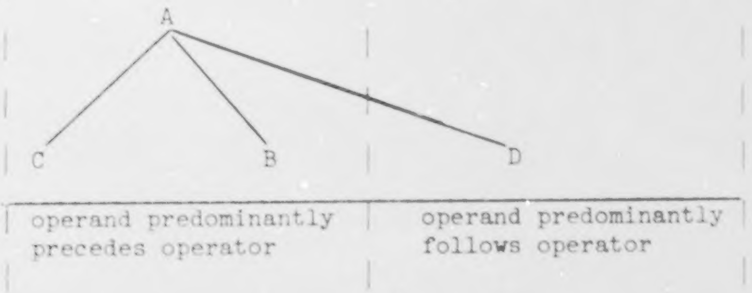
Delete V-AP → AP-V

is required in order to reduce D to A.

A number of linguistic, psychological, logical and other distinctions have been introduced to account for and to explain certain harmonic relations between various word orders. The most common of these distinctions, which are to a large extent used synonymously, are:

Determined - Determiner
Specified - Specifier
Modified - Modifier
Topic - Comment
Argument - Function
Operand - Operator

The way these terms are used linguistically usually lacks precision. Theo Vennemann (1973) has attempted a clear-cut linguistic definition based on the criterion of endocentricity: it is the operand that determines the syntactic category of the construction.[11] Using the distinction operand/operator, one can arrange language types thus:


A
C
B
D
operand predominantly precedes operator
operand predominantly follows operator

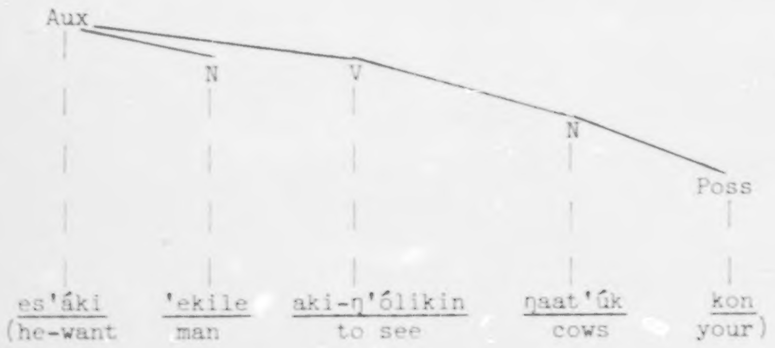
Type C languages are to an extreme degree operand-operator languages whereas type D languages are predominantly operator-operand languages (see Vennemann 1973: 12). There are two significant assymetries in the above diagram which seem to be due to the idiosyncracies of dominant language structure: (a) African languages of the dominant type A are predominantly operand-operator languages, and so are the majority of African languages and types; (b) type D languages are not nearly as much operator-operand languages as the languages of the opposite type C are operand-operator.

Since its beginnings, transformational theory has been based on phrase structure grammar as a means of producing structured strings of categories. Dependency grammar, which was introduced in 1959 (Tesnière 1959), has been developed into a powerful alternative model. One of its main advantages over constituent structure is that it distinguishes between governing (= Head) and dependent elements, thus supplying information not available in phrase-structure grammar. Although an adequate definition of 'Head' is still wanting[12] there seems to be general agreement about certain dependency relations, e.g. that: (1) the verb governs nouns, adverbs, and morphemes expressing negation, tense and aspect, (2) nouns are governed by prepositions/postpositions, (3) the nominative governs the genitive, (4) the noun governs its qualifiers such as relative clauses, adjectives, indefinites, numerals, demonstratives, possessives, as well as case and number markers, (5) lexical items govern non-lexical agreement markers, etc.

It is to be expected that a consistent type C language has the order

Head - Dependent element

so that those elements that top the hierarchy are found to the left, i.e. at the beginning of the sentence while the most dependent elements are found at the end of the sentence. The following sentence from Turkana, an Eastern Nilotic language spoken in Kenya, is characteristic of type C dependency stemmas:

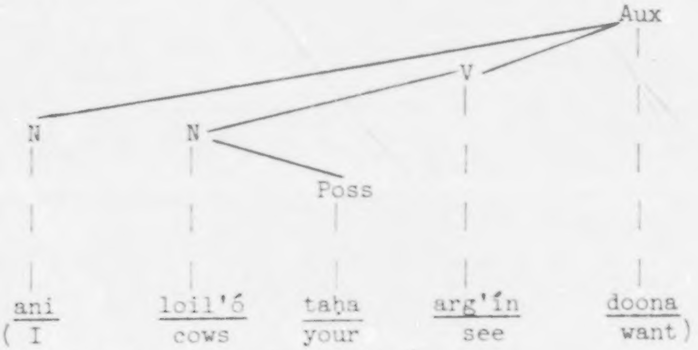


'The man wants to see your cattle.'

In type D languages, again, the order is typically

Dependent element - Head

D languages therefore have the most dependent elements sentence-initially whereas the Head is placed at the end of the sentence. The following sentence from Rendille, an Eastern Cushitic language of the GALLA type, shows the kind of dependency structure that is to be set up for D languages:



'I want to see your cattle.'

Ideally, one would expect that the dependency structure of strict D languages be an exact mirror-image of that of C languages, but this is not the case--at least not in Africa. This is due to the assymetry mentioned above, which seems to be a result of the peculiar structure of dominant word order: dominant structures overwhelmingly exhibit the order Head-Dependent element.

Assuming that there is a one-to-one relationship between word order and dependency, then the question arises whether the comparative study of word order cannot be of help in determining dependency relations. We have claimed above that the Head precedes the Dependent element in type C languages. In strict C languages, on the other hand, the negative particle precedes the tense/aspect markers, and both are followed by the verb. Strict D languages, again, have Dependent element-Head order, and in such languages the verb is followed by tense/aspect markers and both are followed by the negative particle. In the light of this it would seem worth examining the possibility of sentence negation and tense governing verbs rather than the other way around.

5. Areal characteristics

The word order characteristics of African languages cannot only be described in terms of language types. It is almost as important to know in which area a given language is spoken. The proportion of dominant and recessive word order shows some interesting correlations with the geographical distribution of languages. There are linguistic areas in Africa where recessive word order prevails. Languages spoken in the vicinity of such areas are likely to share some of these recessive features. The farther one moves away from these areas the more the number of recessive features tends to decrease. A linguistic area with a high concentration of recessive word order will be called "areal nucleus". There are four major areal nuclei in Africa: (a) the Omotic, (b) the Central Khoisan, (c) the Mande, and (d) the Dosso-Nikki nucleus.

(a) The Omotic nucleus

It is situated on the southwestern end of the Ethiopian Highlands and is made up of Cushitic languages of the KAFFA type. To the west, there is a sharp boundary separating these languages from Nilotic languages of the A and C types. To the north, east and south, there are D languages of the AMHARIC and GALLA types. The Omotic nucleus is the core of a huge convergence area which stretches from Lake Chad to the Indian Ocean. This area is characterized by the presence of type D (Heine 1975). Languages which are spoken at the extreme ends of this convergence area have the smallest number of recessive features. Such languages are Kanuri in the west and Dahalo (southern Kenya) to the south.

(b) The Central Khoisan nucleus

The Central Khoisan languages of Southern Africa form another, though less clear-cut, areal nucleus with the Khoisan family. This nucleus, too, is characterized by the KAFFA subtype of D. The neighbouring Northern and Southern Khoisan languages, which belong to types A and B, have a gradually decreasing amount of recessive word order.

(c) The Mande nucleus

In West Africa, there is a vast area of type B languages which stretches from the southern fringes of the Sahara in the north up to the Atlantic coast in the south and includes over one hundred languages. The northern Mande languages of the MANDING type form the nucleus of this area. They have the largest number of recessive features of all West African B languages.

(d) The Dosso-Nikki nucleus

This nucleus, which is situated on both sides of River Niger south of Niamey, includes languages such as Bariba (Borgu), a Gur language, Dyerma, a dialect of Songhai, and Busa of the Mande group. The Dosso-Nikki nucleus consists of MANDING type B languages.

But the areal significance goes even farther than that: as has been shown elsewhere (Heine 1975), language types cover areas which can be re-analyzed as linguistic convergence areas (areal groups).

6. Word order and language families

Although the linear arrangement of meaningful elements belongs to that part of language which has been shown to be less resistant to change than others the data available allow for some tentative reconstructions of word order in various genetic groupings. These reconstructions are based on the geographical distribution of genetically related languages and their respective word order behaviour.

In a detailed documentation, Talmy Givón (1974) attempts to prove that the Niger-Congo family originally had an SOV syntax. This hypothesis is based on the observation that the present-day languages of this family show a number of word order features which are more characteristic of SOV than of any other type. Our own evidence suggest that Proto-Niger-Congo was of type A. This type is clearly predominant in all branches of the family except Mande, Gur, and Western Kwa, which are type B. But the presence of B in these groups is more likely to be due to innovation than to retention, or, to be more precise, to areal rather than to genetic relationship. This is corroborated by the fact that West African B languages form a closed geographical area[13] which cuts across genetic boundaries.

The development of word order in Niger-Congo can be summarized thus: Proto-Niger-Congo probably was a type A language which placed the subject before and the object after the verb, the nominative before the genitive, and used prepositions. All nominal qualifiers, like adjective, numeral, interrogative, possessive and demonstrative, as well as relative clauses, are likely to have been placed after their governing noun. Moreover, the adverb followed the verb and the adverb. The subject pronoun preceded both the verb and the negative particle whereas the object pronoun followed the verb. In addition, we assume that Proto-Niger-Congo had a noun gender system which used nominal gender prefixes, in a similar way as can be found in modern West Atlantic, Togo Remnant or Bantu languages.

At least one significant typological change must have occurred after the first split of Proto-Niger-Congo[14]: in Mande, one of the branches of Niger-Congo, type A was replaced by B. This replacement must have taken place prior to the splitting up of the hypothetical ancestor language of the Mande branch and led especially to the following changes: the object now precedes the verb, the genitive precedes the nominative, the possessive adjective precedes the noun, and postpositions, rather than prepositions, are used. The Gur, Togo Remnant and western Kwa languages are likely to have borrowed type B from Mande; in cases where the contact can be assumed to have been particularly close (Senufo) it was the MANDING sub-type of B that was adopted.

Elsewhere in Niger-Congo, changes in word order structure were rare, occurring only in isolated languages or language groups.[15] For the main branches, like West Atlantic, Benue-Congo, or Adamawa-Eastern, more or less the same patterns can be reconstructed as for Proto-Niger-Congo: S-V-O order, presence of prepositions, nominative-genitive order, nominal qualifiers following the noun and adverbs following the verb, etc.

No conclusive evidence is available on earlier word order structure within the Afro-Asiatic family, although it is most likely that Proto-Afro-Asiatic belonged to type C (= VSO). This type seems to have been prevalent in three of the six Afro-Asiatic branches, i.e. Berber, Ancient Egyptian, and Semitic. Proto-Berber probably had V-S-O, or V-S-O and S-V-O order, used possessive and demonstrative after, but the numeral and the interrogative adjective before the governing noun, and the adverb after the verb.

If Proto-Afro-Asiatic really was type C then the Chadic branch must have undergone a change from C to A. The arrangement of meaningful elements in Chadic is likely to have been the following: the subject preceded and the object followed the verb, the genitive followed its governing noun, and so did all other nominal qualifiers, prepositions were used, the adverb followed the verb, and the verb structure probably was

*subject pronoun - tense - verb - object pronoun - negative

The most drastic change in Afro-Asiatic seems to have occurred in the Omotic branch which developed a D syntax of the KAFFA sub-type. It would seem that the Cushitic languages--as well as a number of Nilo-Saharan languages--borrowed type D from Omotic; neighbouring groups like Sidamo adopted the rigid KAFFA sub-type whereas other Cushitic groups received the weaker AMHARIC and GALLA sub-types. More recently, after the Semitic intrusion from South Arabia into northeastern Africa, the Ethiopian Semitic languages borrowed a type D syntax from Cushitic (Leslau 1945, 1952), both of the AMHARIC (Ge'ez, Harari) and of the KAFFA (Gurage) sub-types.

A reconstruction of word order within the Khoisan family does not seem possible at present. The best guess would be that it was of type B, as the predominant occurrence of postpositions, genitive-nominative order, and the pre-noun position of the possessive adjective suggest. That Proto-Central-Khoisan, on the other hand, was a D language of the KAFFA type can hardly be doubted.

No attempt is made to consider the word order of Nilo-Saharan as its status as a genetic unit does not seem to have been established sufficiently. The reconstruction of word order in the various sub-groups is made difficult by the fact that the Nilo-Saharan-speaking area has apparently experienced a number of convergence processes which resulted in a large variation of word order structures. The case of Nilotic is typical in this respect. Proto-Nilotic probably had S-V-O order, prepositions, nominative-genitive order, nominal qualifiers followed the noun and the adverb followed the verb, the subject pronoun and the negative particle preceded the verb whereas the object pronoun followed. This structure has been largely retained in Western Nilotic while Eastern and Southern Nilotic adopted a type C syntax within the Rift Valley Convergence Area (Heine 1975). Bari of Eastern Nilotic and Dadog (Tatoga) of Southern Nilotic either escaped the development A → C or else gave up C more recently in favour of A.

Footnotes

*I would like to thank A. E. Meeussen for reading an extended version of this paper and making valuable suggestions for improvement.

[1] There are indeed languages which do not gap; e.g. Thai and Chinese (Bach 1970:11), or Ewe.

[2] For more details, see Heine (1975).

[3] Note, however, that Greenberg also applies the term 'dominant' to quite a different phenomenon, namely with reference to variant orders within a single language (see, for example, his use of this term in his Universals 1, 3, 5, 6, 7, and others). In this case, the term 'basic' is used here instead.

[4] Pairs like unmarked/marked or basic/derived as employed here refer primarily to language-internal comparisons. The use of terms like universal/particular seems premature at this stage of research.

[5] That this is indeed the case can be seen if the tables he gives are confronted with the data of his Appendix II, which are based on a much larger language sample. For example, in Table 1 it is stated that SOV languages do not have both prepositions and noun-adjective order (p. 61). Yet, in Appendix II, languages like Persian, Iraqw, Khamti, and Akkadian are listed which exhibit exactly this combination of orders (p. 87).

[6] A. E. Meeussen emphasizes that for an ergative system to be possible, S and O should be contiguous (personal communication).

[7] Outside Africa, Bashkir is reported to have S-O-V basic, and V-S-O variant order (Dezsö 1970:552).

[8] Note, however, that there are a number of languages having noun-adjective as their basic order which do not tolerate adjective-noun as an alternative.

[9] It is conceivable that there are languages which consist of dominant word orders only. All languages so far studied by us, however, have been found to have recessive features to some extent.

[10] In view of the peculiar characteristics of adjectival morphology in languages like Banda, A. E. Meeussen proposes to consider the status of constituents, rather than word order, as crucial (personal communication).

[11] Note, however, that not in all cases are endocentric constructions involved.

[12] For some criteria see Robinson (1970:272-275).

[13] This is what we call the Senegal-Volta Convergence area.

[14] There are different views about the exact nature of this split: whereas Joseph Greenberg claims that Niger-Congo has six coordinate branches, William Welmers assumes that there are only two branches, one of which is Mande.

[15] Drastic changes must have occurred in languages like Ijo or Nen (Tunen).

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Complementizer Choice in Selected Eastern Bantu Languages

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1. Introduction

The linguistic unity of the Bantu language group is an accepted fact among linguists. Those concerned with the Eastern Bantu languages in particular often find that phenomena--on the phonological, morphological or syntactic levels--which they have discovered to be present in the grammar of one language are paralleled by identical phenomena in other Bantu languages spoken hundreds of miles away. Yet, at the same time, we are often startled to find totally dissimilar behavior in languages which are close neighbors. The majority of the evidence establishing the unity of the Bantu languages falls within the realms of phonology and morphology. Comparison of the phonological and morphological properties of many Bantu languages has led to a fair understanding of the essential phonological and morphological characteristics which must have been present in the proto-language. On the syntactic level, however, the work has barely begun. Although Bantuists recognize some syntactic patterns as 'typical' of Bantu, intensive investigations into the extent to which syntactic phenomena in various Bantu languages parallel or differ from each other are rare. Yet it is precisely this type of investigation which is crucial to our understanding of Bantu syntax.

This type of full scale, intensive investigation is a massive undertaking, which I have barely begun. Nonetheless, I have embarked on a preliminary course to discover what the investigation of one small facet of syntax in several geographically separated Eastern Bantu languages can tell us about the types of results we might obtain if we attempt a systematic investigation of comparative Bantu syntax. These results must, of course, be tested against a wider range of Bantu languages before they can be accepted as valid. In addition, these results must eventually be compared with grammatical descriptions of English and other non-Niger-Congo languages, because such comparisons with clearly unrelated languages enable us to discover the extent to which any conclusions we have reached may be attributed to language relatedness and the extent to which they may reflect language universals.

2. The Problem

In this paper, I have chosen to investigate the verb phrase complementation systems of several Eastern Bantu languages. I shall show how such systems may be related and contrasted, and shall argue that several syntactic-semantic concepts are crucial to an understanding of the complementation systems of these languages.

I have not looked at all, or even most, of the Eastern Bantu languages, but I have examined written materials--grammars and texts--from a number of geographically diverse languages and attempted to arrive at some valid generalizations. In this paper I shall take my examples from two languages: Kamba (Kenya) as described in *Notes on the Kamba Language* by Gerhard Lindblom (1925); *A Kamba Grammar* by E. M. F. (1952); and *Practical Introduction to Kamba* by W. H. Whiteley and M. G. Muli (1962); and from Chewa (Malawi) as described in *A Grammar of Chichewa* by Mark Hanna Watkins (1937). These languages are chosen not so much because they are typical in all respects in their complementation systems as because the ways in which they vary seem to evidence the range of complementation variation which is found. For both of these languages I have attempted to correlate the stated properties of their grammars with the properties exhibited in texts or connected examples so as to reduce the possibility of errors due to the analysts' native languages.

In the investigation of 'common' (i.e. Indo-European) languages, it has often been found that three verbal forms tend to occur differentially in verb phrase complement constructions: Indicatives, Subjunctives, and Infinitives. Verbal forms which are given these labels are also found in most, if not all, of the Bantu languages. They exhibit strong morphological similarity: the indicative form of the verb usually ends in an -a, the subjunctive ends in an -e (-ɛ), and the infinitive is indicated by a prefixed ku- (or variants). These verbal forms are generally found in complement clauses as well as in other syntactic constructions. As there is a great deal of morphological stability of these affixes in the Bantu languages, it is natural to ask whether they are also functionally stable, that is whether the principles governing their appearance in certain syntactic frames--in this case the complement construction--are identical, or close to identical, in all of the Bantu languages.

In each of the Bantu languages I have examined, there are both similarities and differences in the ways in which the different verbal forms are used in the complement construction. The tendency is for the three forms to be used under different circumstances, although in certain cases the governing criteria are such that the verbal forms will contrast. In such circumstances they generally will have different interpretations. The remainder of the paper will be devoted to an exposition of the major morphological devices employed as complementizers in the two object lnaguages, and a discussion of the differences which these complementizers indicate.

3. Preliminary comparison

Both Chewa and Kamba are typical of the Bantu languages I have examined in that all three verbal forms appear in their complement clauses:

1. Infinitives
    a. Chewa[1]
        i. βámícɔ·ni βádáyámbá kup^{h}unzitsa βa·nt^{h}u.
        'the missionaries began to teach the people.'
        ii. maβá tikátɛ́mɛ́ bá·ŋgɔ kudzarukɛ́ vitɛ·tɛ
        'Tomorrow we must go and cut reed(s) (with which) to make harvesting baskets'

b. Kamba

i. andũ onthe me:tata kũlika kĩwanzani makone mũvĩla.
'all the people were trying to get into the stadium to see the game.'

ii. yuyu nũkwĩmanyĩsya kũtwaĩthya.
'now he is learning to drive.'

2. Subjunctives

a. Chewa

i. nifuná kutí nívɛ́ munɔ m̩ bwa·ɔ́ mwánu.
'I wish that I may hear here in your court.'

ii. m̩lɛ́kɛni tcám̩mandja akwatiwɛ́ ku kasú·ŋgu.
'let Chammanja be married at Kasungu.'

b. Kamba

i. nĩngũthi ngathooe mbũi.
'I'm going to buy a goat.'

ii. wĩ:enda nambĩlĩlye wĩa ĩndĩĩ.
'when do you want me to start work.'

3. Indicatives

a. Chewa

i. niɔ·pá kutí aŋgazidáná ná azungu βát^{h}u.
'I fear that he and our Europeans will hate each other.'

ii. wapɛza wazyɔkásɔ́ ti·yí.
'he found that he had again turned into a tiyi (bird).'

b. Kamba

i. aisye kana nũkũka ũmũnthi.
'he said that he is coming tomorrow.'

ii. anambĩie akandũmĩa ĩvuku.
'he told me he would send me the book.'

Yet these two languages do not always select the same verbal form in the same complementation context; and there are morphological differences, as well as similarities, in the construction of complement clauses in each language.

Some complement clauses may be introduced by a special word. In Chewa, this introducer, kutí, may introduce both indicative and subjunctive complements:

4. a. βámícɔ·ni βadáúza βant^{h}u kutí kugulítsana βant^{h}u kɔ·ipa.
'the missionaries told the people that it is bad for people to sell each other.'

b. n fúna kutí musuŋgá·nɛ nikafa inɛ.
'I hope that you protect each other (marry) when I am dead.'

Kamba has two introducers, kana and atĩ, which appear to be in free variation (although *kana* appears more frequently), these words only introduce complements with indicative verbs:

5. a. manaisye atĩ maka:thi Masa:kũ.
'they said that they would go to Machakos.'
b. mwana wa:kwa e:ĩsilya kana e:ana...
'my child thinks that when he grows up...'

Chewa infinitives may have either the subjunctive or the indicative suffix, as is shown by (1a) above; while Kamba infinitives are invariably indicative, as is shown in (1b). Thus, although there are obvious morphological similarities in the complementation systems of these two languages, there are also rather clear points of difference. What remains to be shown is whether these variations are due to essential differences in the syntactic/semantic structures of complementation in these two languages; or are two alternate variations on the same essential organization. The answers to this question can only be reached through the detailed examination of complementation in each language, and the careful comparison of the results of these examinations.

4. *Chewa complementation patterns*

Chewa has six morphologically distinct complementation patterns:

6. a. Bare Indicative
b. *kutí* Indicative
c. Bare Subjunctive
d. *kutí* Subjunctive
e. Indicative Infinitive
f. Subjunctive Infinitive.

Bare indicative complements, as exemplified by

7. a. βapɛza wawuma wɔ́·sɛ.
'they (she) found that it had all dried up.'
b. titsɔgɔlɛ takátɛ́má sú·ŋgwi.
'we must cut bamboo.'

are most uncommon along the citations in Watkins' grammer; they appear only after the verb 'find out' and after a few so-called auxiliary verbs. The *kutí* indicative complement occurs somewhat more extensively.

8. a. βafuna kutí ni·zíyɛ́ndá ní βa·nt^{h}u.
'they wish that I shall go about with people.'
b. ṃdzi·βa kutí watitúndu·ra
'you know that he has accused us falsely.'

The word *kutí* follows all verbs expressing mental states. In both types of complement, there appears to be an additional characteristic: an implication that the speaker believes the complement clause to be true (if past in time) or highly likely (if set in the future). Thus, in Chewa, the indicative is an indication that

that the speaker of a sentence takes the complement to be true, while the use of the word *kutí* corresponds to an assertion about the subject of the sentence's mental processes.

Chewa subjunctive sentences support these conclusions. *kutí* subjunctive complements:

9. a. nifúna kutí musuŋgá·nɛ nikafa inɛ.
   'I hope that you protect each other (marry) when I am dead.'
   b. muniú·zɛ kutí nidzí·βɛ
   'you must tell me so that I may know'

again follow verbs of mental states, and also of saying. However, when the subjunctive is used in the lower clause the speaker does not convey any commitment to the truth, or probable truth of the complement clause. Bare subjunctives:

10. a. tíyɛni mkákambɛ ku ${}^{m}p^{h}$ara kwá fúmu
   'let us go so that you can talk (defend yourselves) in the chief's court'
   b. tikutí tí·dj̣ɛ
   'we want to eat'.

not only carry no prediction of truth by the speaker, but also imply no prediction of the eventual truth of the complement by the subject of the sentence. (Although a particular outcome may be very much desired.) Note also that in the second example the verb root is *tí*, "want, say", this verb is never followed by the form *kutí* which looks like its infinitive.

Thus we see that in the selection of the proper complement type with an inflected verb form, two parameters are crucial. The first is the type of verb used in the main clause, and the second, the speaker's commitment to the truth or probability of the complement proposition.

Infinitival complements generally require that the subjects of the main clause and of the complement clause be identical.

11. a. βámícɔ·ni βádáyámbá kup^{h}unzitsa βa·nt^{h}u
   'The missionaries began to teach the people'
   b. maβá tikátɛ́mɛ́ bá·ŋgɔ kudzarukɛ́ vitɛ·tɛ
   'tomorrow we must go and cut reed(s) (with which) to make harvesting baskets'

(There are some minor exceptions to this rule which are of no concern here.) When the infinitive is used in the complement cluase there is no overt subject in that clause. Thus we might postulate the operation of an Equi NP Deletion rule which works to delete the lower of two identical subjects, along with a rule specifying subjectless verbs as infinitives. Infinitives in complement clauses may be either indicative, as in (11a), or subjunctive, as in (11b). The indicative infinitive is used for events in the past, or for events in the near future, which are presumably sure to come about. The subjunctive infinitive is used for events that are seen as distant in time or place, and hence nowhere near as sure to come about.

Thus we see that a similar set of principles is used to govern the choice of indicative versus subjunctive infinitives in complement clauses as was used to choose between indicative and subjunctive on inflected verbs in complements. There are some differences however. Although in both cases subjunctives represent the speaker's neutrality with respect to the event specified by the complement clause ever coming into being, in the case of the infinitive there is a clear implication that it is impossible to predict the event because it is set in some distant time or place over which neither the speaker nor the actors have any control. In the case of the inflected subjunctive this removal is not necessary, it is sufficient that the speaker wishes, for any reason, to express uncertainty about the outcome.

The indicative infinitive is used for past (realized) events and for events in the near future which the speaker is sure will come true. Thus the indicative infinitive indicates the same speaker attitude as the indicative on an inflected complement verb.

However, this is not the full picture. If it is the case that indicative infinitives meet exactly the criteria for indicative inflected verbs with the addition of identical subjects in the matrix and complement clauses, then there should be no indicative complements with identical subjects present in both clauses. They should always be replaced with infinitival complements. Yet the verb 'find out', *pɛza*, always takes the bare indicative complement, even when the subjects of the main and complement clauses are identical (see sentence (3.a.ii)). Thus, another parameter must be at work in the formation of indicative infinitives. Unfortunately, I have not yet determined what the additional factor may be. Possibly, there must be an immediate relationship between the action of the main and embedded clauses; but I have not yet been able to work out such a concept to my own satisfaction.

Since subjunctive infinitives only occur with events at a remove from the action of the matrix clause, there are naturally cases of subjunctive inflected complements with the subjects of the matrix and complement clauses identical. These generally refer to events in the near future where the speaker is nonetheless unwilling or unable to predict realization. Thus, the rule forming infinitive complements must be sensitive not only to the presence of identical subjects in each clause, but also to the situational pragmatics of the sentence.

Thus, in Chewa, the choice of complementizer is controlled in part by the syntactic elements of the sentence, and in part by the pragmatics of its use. The choice between indicative and subjunctive indicates the speaker's beliefs about the truth (or eventual realization) of the complement clause. The form *kutí* is selected by a particular class of matrix verbs which indicate the mental activities of the subject of the higher clause. While the use of the infinitive requires the identity of matrix and complement subject as well as specific satisfaction of requirements of truth, decideability, and so on. Thus, a complex interaction of meaning, lexical items, and speaker beliefs all go into the choice of complement type in Chewa.

5. Kamba complementation patterns

Kamba has five complement patterns:

12. a. Bare Indicative
    b. *kana* Indicative
    c. Simple Subjunctive
    d. (Indicative) Infinitive
    e. Future Subjunctive

Thus it is clear that there must be some differences in the choice of complementizer in Kamba as compared to Chewa. Nontheless, the rules governing complementizer choice in Kamba use similar criteria to those of Chewa, although the specific pairings of criterion and complementizer will often differ.

Indicative complements, with or without the introductory *kana*, only follow verbs of saying or mental activity. *kana* is used when the complement is a statement of fact, no introducer is used when the complement represents an intention or possible, but not certain, event. Thus compare:

13. maisye kana nĩ mũtamanu
    'they said that he was stupid.'
14. amanyĩsya maisye maimũmanyĩsya ĩngĩ
    'the teachers said that they would not teach him anymore.'

In the first case, the complement represents a statement of fact on the part of the subject of the higher clause, while in the second case, it represents an intention on the part of the subject of the higher sentence. At the same time, it appears that speaker evaluation of the truth of the complement, or its probable realization if set in the future, also plays a part in deciding whether the introductory *kana* will be employed. Thus in the sentences given as (3.b.i) and (3.b.ii), repeated here:

3. b. i. aisye kana nũkũka ũmũnthi
         'he said that he is coming today.'
      ii. anambĩie akandũmĩa ĩvuku
         'he said that he would send me the book.'

we have two reported promises as to the future action of the reported complement sentence. However, it seems that we have a different atitutde towards these promises on the part of the speakers of these sentences. In the first case, the speaker believes that the promise will be kept, while in the second case, the speaker only reports the promise, but does not express conviction that it will be kept. Thus, as in Chewa, the speaker attitude seems to affect the form of the complement clause.

The infinitive complement in Kamba, again as in Chewa, is only used when the subjects of the matrix and complement clauses are identical. Thus, we might posit an Equi-NP deletion rule for Kamba too. Infinitival complements never follow the verbs which I have just described which take indicative complements. Thus, the posited Equi-NP rule must be sensitive to the matrix verb as well as to the subject NPs. The simple infinitive is used when the action of the complement is seen as true or following immediately on the action of the main clause thus:

15. syana niũthi kũthauka mũvi:la
'the children are going to play football.'

In this sentence the children are seen as on their way to the game, and the playing is seen as certain to take place. When the complement is seen as not automatically following upon the action of the main verb, the subjunctive will be used. Thus:

16. nĩngũthi ngathooe mbũi
'I'm going to buy a goat.'

In this case, the action of going is seen as not necessarily resulting in the purchase of the goat, perhaps none will be for sale today, or the buyer will not agree to the seller's price. Here the subjunctive is used on the complement verb, along with the future tense marker, -ka-, which indicates the distance between the action of the two verbs. If the buying of the goat were seen as certain, the sentence could be rendered:

17. a. nĩngũthi kũthooa mbũi
'I'm going to buy a goat.'
b. ngathooa mbũi.
'I'm going to (gonna) buy a goat.'

In the first case, the need for travel to get the goat is explicitly indicated, while in the second case, only the futurity is indicated.

In addition to the future subjunctive mentioned above, the subjunctive is used in complements in Kamba whenever the conditions for indicative or infinitive complements as described above are not met. That is, after verbs other than those of speaking or mental activity whenever the conditions for neither the infinitive nor the future subjunctive are met. Thus, the subjunctive does not necessarily indicate the improbability of the action of the complement as it does in Chewa, as it must be used when the subjects of the two clauses differ after certain verbs:

18. wĩ:enda nambĩlĩlye wĩa ĩndĩĩ?
'when do you want me to start work?'

is an example of a sentence where the action of the complement is expected to come about, but since the subjects of the two verbs, 'you' and 'I', are different, the subjunctive is employed.

Thus, the choice of complement types in Kamba, as in Chewa, is based on a complex of syntactic and pragmatic criteria. The indicative complements are only used with matrix verbs of speech or mental states, and no other complement types may follow these verbs. The infinitive is used when the matrix and complement sentences have identical subjects, and when the action of the two clauses are sufficiently closely related. The subjunctive is used in all other cases. Speaker evaluation of the truth of the complement is necessary not only for the use of the infinitive, but also for the *kana* indicative.

6. Conclusions--Chewa and Kamba compared

If we compare the choice of complement type in Chewa and Kamba we find that there are extensive similarities in the criteria used for the selection of complementizers in both languages, just as there are extensive similarities in the morphology of the complementizer systems of these languages. However, the specific morphological forms governed by the specific set of criteria will often differ. Most importantly, in Chewa the use of the indicative complement depends on the speaker's evaluation while in Kamba it depends on the type of matrix verb. In Chewa the introductory word *kuti* is correlated with the same class of verbs which predict the indicative in Kamba; while the introductory word *kana* in Kamba is used only with the indicative class of verbs, but then indicates the same speaker attitude that predicted the indicative in Chewa. Thus, the same two parameters are used with skewed effect.

While both Kamba and Chewa are in essential agreement as to the use of the indicative infinitive complement type, they differ in that Chewa uses the infinitive with a subjunctive ending for distant events, while Kamba uses a future tense inflected subjunctive for these cases. In general, Kamba uses the finite subjunctive complement more widely than Chewa does. These various differences are schematized in Table 1.

Table 1. Comparison of complement systems: speaker evaluation

matrix verb	positive	neutral
1. speech or mental state		
Chewa:	*kuti* indicative	*kuti* subjunctive
Kamba:	*kana* indicative	bare indicative
2. other		
a) subjects different		
Chewa:	bare indicative	bare subjunctive
Kamba:	simple subjunctive	simple subjunctive
b) subjects same		
i. direct		
Chewa:	indicative infinitive	bare subjunctive
Kamba:	infinitive	simple subjunctive
ii. distant		
Chewa:	not applicable	subjunctive infinitive
Kamba:	not applicable	future subjunctive

Thus we see that in the detailed comparison of the identical constructions in two separate Bantu languages we may find that although the morphological forms employed in the construction are quite similar, and the factors governing the choice of morphological form are also similar, the specific meshing of syntactic, semantic and pragmatic factors with morphological forms may vary widely. From this we must conclude that an understanding of comparative Bantu grammar cannot be attained simply through the discovery of points of similarity or difference in the morphological systems of Bantu languages, but must also be based on a careful investigation of the ways in which superficially similar forms are actually used in each language.

Footnote

[1] The Chewa transcription is Watkins'; the Kamba is standard orthography.

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Temne Complementation*

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1. Introduction

Temne is a West Atlantic language spoken mainly in the Northern Province of Sierra Leone. It belongs to the southern West Atlantic sub-group, the group Dalby (1965) classifies as 'Mel'.[1]

2. The simple sentence

The simple sentence in Temne is as follows:

(1) a. idira 'I sleep'
b. ɔdira 'He sleeps'

There are no tenses in Temne. Tense is indicated by adverbials:

(2) a. idira 'I sleep'
b. idira dɨs 'I slept yesterday'
c. ɔdira 'He sleeps'
d. ɔdira dɨs 'He slept yesterday'
e. Musaŋ ɔdira 'Musa sleeps'
f. Musaŋ ɔdira dɨs 'Musa slept yesterday'

There is a pronominal copy of the subject on the verb even when there is a full NP subject.

The order of elements in Temne is

(3) Subject Verb Indirect Object Direct Object
Murkɛŋ ɔtaka Abɔŋ Asar
'Murkeh gives Abu the stone'

Aspect in Temne can be marked either lexically or by tone shift. For lexical marking the following verbs are used: po - completive:

(4) a. ipo der 'I have come'
b. ipo kɔnɛ 'I have gone'

bɔk - duration

(5) ibɔk der 'I was coming'

and tə - futurity

(6) ite kɔnɛ 'I will go'

In addition, te is also used to describe actions that are taking place but which will also continue in the future.

(7) ɔte dira 'He is sleeping'

means that he is sleeping now and will continue to sleep if no one interrupts him.

In all these sentences a tone shift can be used to convey the same meaning, even without the aspect markers. Thus the sentences in (8) are equivalent to each other:

(8) a. ɔ̀dɛ̂r = ɔpo der 'he has come'
b. ɔ̀kɔ̀nɛ̂ = ɔte kɔnɛ 'he will go'

Modality in simple sentences is marked with tek 'should, must' as in:

(9) a. ɔyi tek der 'he should come'
b. ɔba tek der 'he must come'

which is, of course, a case of clefting but which I will not deal with in this paper.

3. Complementation

In the simplest embedding, where one has like subjects, Equi-NP-Deletion occurs as in the following:

(10) a. iyema kɔnɛ 'I want to go'
b. ipo kɔnɛ 'I have gone'

When Equi-NP-Deletion has occurred, no overt complementizer is possible and therefore the sentences shown in (11) and (12) are ungrammatical:

(11) a. *iyema kɨyi kɔnɛ
b. *iyema kaŋka kɔnɛ
c. *iyema kama kɔnɛ
d. *iyema kɨyi kaŋka kama kɔnɛ

(12) a. *ipa kɨyi kɔnɛ
b. *ipa kaŋka kɔnɛ
c. *ipa kama kɔnɛ
d. *ipa kɨyi kaŋka kama kɔnɛ etc.

In the case of unlike subjects or like subjects with verbs of saying, overt complementizers are required:

(13) a. ipa kɨyi ikɔnɛ 'I said that I went'
b. ikanɛmu kɨyi ɔkɔnɛ 'I told you that he went'

Verbs of saying are simply reportative, that is, they are neutral to the truth value of the embedded sentence.

With most verbs, the equivalent of English 'that' is any one of three complementizers: kɨyi, kaŋka and kama, which, under certain conditions, can co-occur:

(14) a. ipa kɨyi ɔkɔnɛ 'I said that he went'
b. ipa kaŋka ɔkɔnɛ 'I told him to go'
c. ipa kama ɔkɔnɛ 'I asked him to go'
d. ipa kɨyi kaŋka ɔkɔnɛ 'I ordered him to go'
e. ipa kɨyi kama ɔkɔnɛ 'I requested that he go'
f. ipa kaŋka kama ɔkɔnɛ 'I told him to go'
g. ipa kaŋka kɨyi kama ɔkɔnɛ 'I ordered him to go'
h. ipa kɨyi kaŋka kama ɔkɔnɛ 'I asked him to go'
i. *ipa kama kɨyi ɔkɔnɛ
j. *ipa kama kaŋka ɔkɔnɛ

In (14g) we observe that kaŋka precedes kɨyi to yield a grammatical sentence but with (14i) and (14j) we get ungrammatical sentences. That is to say that kama when used with the others cannot precede any of the other complementizers.

Since in (14a)-(14h) the verb does not change but the complementizers and meanings do, then the difference in meaning must reside in the complementizers.

3.1. Selection of complementizer. In the first place, kɨyi, if followed by a high tone, is neutral. However, if followed by low tone when used with certain verbs, it is equivalent to kaŋka as in

(15) a. ipa kɨyi ɔ́kɔ̀nɛ̀ 'I said that he went'
b. ipa kɨyi ɔ̀kɔ̀nɛ̀ 'I told him to go'
c. ipa kaŋka ɔ̀kɔ̀nɛ̀ 'I told him to go'

Tone after kaŋka and kama never changes, which again indicates that meaning differences lie in the meanings of the complementizers.

Let us then examine the meanings conveyed by these complementizers both individually and in combination.

3.2. The semantics of the complementizers. We begin with kɨyi. Kɨyi is used when the speaker is simply reporting. However, a sentence such as (16a) may be realized with two different tonal patterns--(16b) and (16c):

(16) a. ipa kɨyi ɔfumpə 'I said that he fell'
b. ipa kɨyi ɔ́fùmpə̀
c. ipa kɨyi ɔ̀fùmpɔ̀

In (16b) we have a high tone following the complementizer which indicates neutrality on the part of the speaker with respect to the truth value of the embedded sentence. In (16c) with low tone following the complementizer the speaker is specifically asserting the truth value of the embedded sentence. As a result (16d) is grammatical, but (16e) is semantic nonsense.

(16) d. ipa kɨ́yi ɔ́fûmpɔ́ kɛrɛ pyɛ yi 'I said that he fell, but it was not so'
e. *ipa kɨ́yi ɔ̀fûmpɔ̀ kɛrɛ pyɛ yi

The tone shift referred to here is not an arbitrary property of the element which next follows the verb but rather a property of the pronominal copy of the subject which is prefixed to the verb. That is, if the subject of the embedded sentence is a full NP its tone never changes, as can be seen in (16f) which has the same truth value as (16b), while (16g) has the truth value of (16c).

(16) f. ipa kɨ́yi àbɔ̀ŋ ɔ́fûmpɔ̀
g. ipa kɨ́yi àbɔ̀ŋ ɔ̀fûmpɔ̀

This phenomenon can be summarized as :

(17) kɨ́yi { + [+hi tone] neutral to truth value
+ [+low tone] assertion of truth value

Kaŋka and *kama*, on the other hand, are used when the subject of the higher clause wants a certain outcome which can be reflected by the lower clause.

Kaŋka, in addition to its function as a complementizer can also function as a subordinate conjunction for purpose clauses as in (18).

(18) a. igbasi aŋ gbat̪ɔ kaŋka igbək akɨ́nt
'I take the machete so that I can cut the stick'
b. ikanɛ kɔ kama ɔkɔnɛ kaŋka ate nənk kɔ
'I asked him to go so that he wouldn't be seen.'

The selection of *kaŋka* or *kama* is dependent upon the amount of control the subject of the higher sentence has over the situation, that is, whether he can force the subject of the lower sentence to perform the action or whether the subject of the lower sentence can actually do whatever he wants.

The following sentences show how this dichotomy is realized:

(19) a. ikanɛ kɔ kaŋka ɔkɔnɛ ro baŋka
'I told him to go to the hut.'
b. iyema kaŋka ŋder
'I want you to come.'
c. ikanɛ kɔ kama ɔkɔnɛ ro baŋka
'I asked him to go to the hut.'
d. pa kurɔŋ mɔ pa kama pyɔnɛ ye,ptə yɔnɛ
'If God says it will happen, it will.'
e. pa nəsaŋ mɔ kanɛ ɔwant kama ɔte bok e, ɔbok yɛ
'When the spider asked the child not to cry, he didn't.'

In (19a) and (19b) kaŋka is the proper complementizer if the act of ordering someone is pragmatically appropriate; that is, if the person speaking is in a position to control the actions of the person addressed.

Kama (the other complementizer) would then be used in (19c), (19d) and (19e) where the action is completely left to the discretion of the person addressed.

The use of kama with requests is equivalent to English 'please' or 'if it may please you.' In cases like (19d) and (19e) where requests are not involved, the opposition between kaŋka and kama disappears, in general in the direction of kama.[2] Thus, what distinguishes kama from kaŋka or even kɨyi is that the subject of the higher sentence not only controls the situation but also determines the result. The relationship between the subject of the higher clause and that of the lower clause is pragmatically more intimate with the use of kama than it is with any of the other complementizers.

This is the main reason why kama is the most frequently used complementizer in Temne; its use carries with it the notion of humbleness, friendship, and open-mindedness to others. It is also for this reason that in a structure like (20) we get kama after the two other complementizers so that the order can be made a polite one.

(20) iyema kɨyi kaŋka kama ŋkɔnɛ 'I want you to go'

What I have said so far is true not only of pa 'to say' but is also true of all the other verbs of saying such as:

(21)	fɔf	'speak'
	kanɛ	'tell'
	lɔm	'report'
	ţɛlma	'talk'
	tam	'narrate'

Sentences illustrating these uses are:

(22) a. ifɔf kaŋka kama ɔtəl 'I speak so that he may listen'
b. ikanɛ kɔ kɨyi ɔ̃dèr 'I told him that he has come'
c. ilɔma kɔ kɨyi ŋdira 'I reported to him that you slept.'
d. iţɛlmanɛ yɛ kɔ 'I don't talk to him.'

Since kɨyi is neutral with respect to truth value, it is almost predictable that it is the only form used with verbs of mental activity as the following examples show:

(23) a. inanɛ kɨyi asar ʃaŋ 'I think it is a stone.'
b. *inanɛ $\left\{\begin{matrix}\text{kaŋka}\\ \text{kama}\end{matrix}\right\}$ asar ʃaŋ
c. ilanɛ kɨyi ɔtə der 'I believe that he will come'
d. *ilanɛ $\left\{\begin{matrix}\text{kaŋka}\\ \text{kama}\end{matrix}\right\}$ ɔtə der

(23) e. iyema kɨyi ŋpa kɨyi ŋtamtamnɛyɛ kɨyi yɛ ipa
'I want you to say that you don't remember my saying so' (that that was what I said)

f. *iyema kɨyi ŋpa kɨyi ŋtamtamnɛyɛ $\left\{\begin{matrix}\text{kaŋka}\\ \text{kama}\end{matrix}\right\}$ yɛ ipa.

g. pəbalanɛ mɔ kɨyi ɔ̃kɔ̃nɛ̃
'It seems as if he has gone'

h. *pəbalanɛ mɔ $\left\{\begin{matrix}\text{kaŋka}\\ \text{kama}\end{matrix}\right\}$ ɔkɔnɛ

It is interesting to note that the verb balanɛ mɔ 'seem as if' has a structure with kɨyi, as in (24a) which can also occur as (24b).

(24) a. pəbalanɛ mɔ kɨyi Fodeŋ ɔpo der
'It seems as if Foday has come.'

b. Fodeŋ pəbalanɛ mɔ kɨyi ɔpo der
'It seems as if Foday has come.'

This does not represent a case of raising but rather of fronting of the subject NP of the lower sentence for purposes of focus. We can easily see that this is so because balanɛ mɔ retains its abstract subject prefix pə.

If balanɛ mɔ is used with the normal person prefix in a sentence such as (25) its meaning is then 'to resemble.'

(25) Fodeŋ ɔbalanɛ mɔ wir. 'Foday looks like a goat.'

When it comes to verbs of desiring, it depends on how strongly the speaker wants the outcome of the embedded sentence, as can be seen in:

(26) a. iyema kɨyi ɔder 'I want him to come.'
b. iyema kaŋka ɔder 'I (strongly) desire that he come.'
c. iyema kama ɔder 'I am in favor of his coming.'
d. iyema kaŋka ɔder, aŋ 'I am dying for him to come, fela ɲɔŋ aŋ po mi bʌk I miss him.'
e. iyema kɨyi ɔder kɛrɛ bepi ɔgbəli yɛ ye pəbayɛ apa
'I want him to come but if he can't it doesn't matter'.
f. iyema kaŋka kama ŋder hali itɛyɛ ate yɔnɛ ye
'I strongly urge you to come no matter what happens.'

Only kɨyi can occur with the sentence 'I would like him to come but I don't really care' as shown by the following:

(27) a. iyema kɨyi ɔder kɛrɛ pəbayɛ apa.
b. *iyema $\left\{\begin{matrix}\text{kaŋka}\\ \text{kama}\end{matrix}\right\}$ ɔder kɛrɛ pəbayɛ apa.

Also predictable is the fact that verbs of urging and persuading cannot occur with kɨyi since they themselves already show the interest of the speaker in the outcome of the embedded sentence.

(28) a. *igbɛlɛŋ kɔ kɨyi ɔ yokanɛ
'I urged him to get up.'
b. *inɛmt̪ɛnɛ kɔ toto kɨyi ɔtɔ apla
'I begged him repeatedly to pound the rice.'
c. *ifɔfanɛ kɔ toto kɨyi ɔt̪or
'I persuaded him to come down.'

In contradistinction to what Rosenbaum (1967) proposed for English and Robin Lakoff (1968) for Latin, at least in Temne the selection of complementizers is not simply arbitrary but is instead determined by a combination of the semantics of the higher verb and the pragmatics of the situation.

The complementizers which the verbs take can be summarized as:

(29) Verbs of saying			
pa	'say'	[+kɨyi]	reportative
fɔf	'speak'		
kanɛ	'tell'	±kɨyi	
lɔm	'report'	+kaŋka	desiderative
tam	'narrate'	+kama	
	etc.		
Verbs of mental activity			
lanɛ	'believe'	[+kɨyi]	reportative
nanɛ	'think'		
balanɛ mɔ	'seem'	*kaŋka	
tamtanɛ	'remember'	*kama	
	etc.		
Verbs of desire			
yema	'want'	[+kɨyi]	neutral
	etc.		
		+kaŋka	desiderative
		+kama	
Verbs of persuading			
yifanɛ	'ask of someone'	[*kɨyi]	
gbɛlɛŋ	'urge'	+kaŋka	desiderative
	etc.	+kama	

Footnotes

*I wish to thank Amy Myers, Beatrice L. Hall, and R. M. R. Hall for their comments on previous versions of this paper. I would also like to express my gratitude to Robert S. Picciotto, Dean of Foreign Students at Queens College, for the encouragement which he has given me and the confidence which he has shown in me.

[1] The data in this paper is based on the dialect of Temne spoken in Kassirie where I was born and raised. Kassirie is one of the major trading towns along the Kolenten River in Kambia District of Sierra Leone.

I am a Soso but I grew up in Kassirie, a predominantly Tenme-speaking town and therefore I am bilingual in Soso and Temne.

There is another major dialect of Temne which has some differences from my own. It is spoken mainly in the Tonkolili District of Sierra Leone and is referred to as Konike. However, I have checked my data with speakers of this dialect as well as with other speakers of my own dialect in New York and we all agreed that this data accounts for all of our dialects.

[2] Notice that in English, in exactly these sorts of sentences, the distinction between 'ask' and 'tell', is also neutralized as can be seen in (i) and (ii).

(i) 'The spider told the child not to cry and he didn't.'

(ii) 'The spider asked the child not to cry and he didn't.'

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.202-209 (1975)

Relative Clauses and Nominalized Sentences in Yoruba

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One characteristic feature of a relative clause in Yoruba is that it is introduced by the relative particle tí 'that'. The occurrence of this particle is, therefore, sometimes believed to be a sufficient indication that a noun phrase contains a relative clause. Thus in sentences (1) to (3), the subject of each sentence is considered to be a noun phrase containing a relative clause.

(1) ìwé tí mo rà dára
book that I buy good
'The book that I bought is good'
(2) rírà tí mo ra ìwé dára
buying that I buy book good
'The buying that I bought a book is good'
i.e. 'The fact that I bought a book is good'
(3) kíákíá tí mo ra ìwé dára
quickly that I buy book good
'Quickly that I bought a book is good'
i.e. 'The fact that I bought a book quickly is good'

Since the relative clause must have a noun antecedent or 'head' to which it is a 'qualifier', the initial word in each of the above sentences is therefore automatically regarded as the noun head.[1]

A close scrutiny of the above sentences, however, reveals important differences between (1) on the one hand, and (2)-(3) on the other. Semantically, a restrictive relative clause provides additional information about the noun it qualifies.[2] Thus in (1) we are told that there is a book, and that the book is the particular one bought by the speaker. In contrast to this, (2) does not refer to a particular type of 'buying' nor does (3) to a particular kind of 'quickly'. Rather the reference is respectively to the fact of buying a book, and of buying it quickly.

The semantic difference noted above is paralleled by a number of syntactic differences. Firstly, it is possible to delete the relative clause in (1) and yet have a grammatical sentence that retains the essential meaning of the original sentence. Thus, although (1) can pass as an expansion of (4), neither (5) nor (6) appears to be grammatical, and they are far removed from the meanings of (2) and (3) respectively.

(4) ìwé dára
book good
'The book is good'
(5) *rírà dára
buying good
'The buying is good'
(6) *kíákíá dára
quickly good
'Quickly is good'

Secondly, the meaning expressed in (1) can be captured by the sentences in (7) but no such sentences are available for (2) and (3).

(7) ìwé .kan wà; mo ra ìwé náà; ìwé náà dára
book one is; I buy book the; book the good
'There is a certain book; I bought the book;
the book is good'.
(8) *rírà .kan wà; mo ra rírà ìwé náà; rírà náà
buying one is; I buy buying book the; buying the
dára
good
'There is a certain buying; I bought the buying of
the book; the buying is good'
(9) *kíákíá .kan wà; mo ra kíákíá ìwé náà; kíákíá
quickly one is; I buy quickly book the; quickly
náà dára
the good
'There is a certain quickly; I bought the quickly
of the book; the quickly is good'

Quite apart from the ungrammaticality of (8) and (9), the meanings conveyed by these sentences, to the extent that such meanings can be grasped, are very different from the meanings of (2) and (3) respectively.[3]

Thirdly, the relative clause in (1) can be questioned by .wo 'which', but neither of the two analogous clauses in (2) and (3) can be so questioned. The following sentences illustrate this point:

(10) ìwé .wo ni ó dára?
'Which book is good?'
(11) *rírà .wo ni ó dára?
'Which buying is good?'
(12) *kíákíá .wo ni ó dára?
'Which quickly is good?'

Although (10) is a possible questioning of the relative clause in (1), the analogous questions for (2) and (3) appear to be not only ungrammatical but inappropriate to the sentences concerned.

Considering the semantic and syntactic differences outlined above, it is clear that sentence (1) on the one hand, and sentences (2) and (3) on the other do not belong together. Whereas it makes sense to talk of a head and a qualifier in respect of the noun phrase in (1), the same division is inappropriate and meaningless for (2) and (3). In fact, these two sentences contain instances of a factive nominalization which presupposes the truth of the action or state asserted in the sentence that is nominalized. Thus in (2) there is a presupposition that a book is bought and in (3) that this book is bought quickly. An alternative way of forming a factive nominalization is by adding pé 'that' to the sentence. Thus (2) and (3) could as well be expressed by (13a) and (13b) respectively where the pé form of the nominalization substitutes for the pseudo relative construction:

(13) a. pé mo ra ìwé dára
that I buy book good
'The fact that I bought a book is good'
b. pé mo ra ìwé kíákíá dára
that I buy book quickly good
'The fact that I bought a book quickly is good'

Sentences such as (13) result from a movement transformation in which the factive nominalization originally occurring after a verb is moved to become the superficial subject thus replacing the impersonal subject ó 'it'. Thus (13a) is derived from (14a). The factive nominalization also has two other variants introduced by bí and tí as shown in (14b) and (14c) respectively.

(14) a. ó dára pé mo ra ìwé
it good that I buy book
b. ó dára bí mo ṣe ra ìwé
it good as I buy book
c. ó dára tí mo ra ìwé
it good that I buy book
'It is good that I bought a book'
i.e. 'The fact that I bought a book is good'

A factive nominalization typically occurs as subject with verbs that can take the impersonal subject ó 'it'. Examples of such verbs are dára 'be good', dùn 'pain', wù 'please', sú 'tire', bí nínú 'make angry', dùn mọ́ 'be pleasing to', yà lẹ́nu 'surprise'. Whereas a nonimpersonal verb can occur with a true relative clause, such occurrence is not possible with a factive nominalization. Thus, the noun phrase in (1) which contains a relative clause can occur with the verb tóbi 'be big' as in (15a), but the noun phrase in (2) cannot so occur, as the impossibility of (15b) illustrates.

(15) a. ìwé tí mo rà tőbi
'The book that I bought is big'
b. *rírà tí mo ra ìwé tőbì
'The fact that I bought a book is big'
c. *ó tőbi pé mo ra ìwé
'It is big that I bought a book'

The impossibiilty of (15b) is not just a factor of the incompatibility of subject and verb in terms of selectional restrictions. It derives directly from the fact that the verb in question cannot occur with an impersonal subject as the non-occurrence of (15c) shows.

The claim has been made earlier that the noun phrase in

(1) ìwé tí mo rà dára
book that I buy good
'The book that I bought is good'

is a case of the occurrence of a true relative clause. But there is, in fact, another reading of (1) which makes it a factive nominalization as well, i.e.

(16) ìwé tí mo rà dára
book that I buy good
'The fact that I bought a book is good'

which is identical in meaning with (13a) and (14a). This fact is interesting in that it shows that the pseudo relative clause is a uniform way of expressing a factive nominalization. Thus (1) is both a noun phrase containing a head noun plus a relative clause qualifier, and a factive nominalization. This ambiguity is clearly borne out by the two different meanings and the fact that (16) can be substituted by one of the variants of a factive nominalization.

That noun phrases analogous to the one in (16) can be interpreted as a factive nominalization is something which can be easily demonstrated. In the first place, there are such phrases which admit only of this interpretation. For example,

(17) ọ̀rẹ́ mi tő kú ni kȍ jẹ́ kí n wá
friend my that he died is not let that I come
'It was the fact that my friend died that
prevented me from coming'

can only be interpreted as a factive nominalization. Any attempt to interpret it as a relative clause will give the nonsensical meaning that my friend who was already dead was able to prevent me from coming. Secondly, there is a difference in the questioning of the two types of noun phrases. This difference is best illustrated in the case of an ambiguous sentence such as

(18) ọ̀rẹ́ mi tő dé ni kȍ jẹ́ kí n wá
friend my that he arrived is not let that I come

(18) a. 'It was my friend that arrived that prevented me from coming'
b. 'It was the fact that my friend arrived that prevented me from coming'

The (a) meaning corresponds to the interpretation as a relative clause, while the (b) meaning corresponds to the interpretation as a factive nominalization. The appropriate questioning of the noun phrases is as follows:

(19) a. ta ni kò jẹ́ kí n wá
who is not let that I come
'Who prevented me from coming?'
b. kí ni kò jẹ́ kí n wá
what is not let that I come
'What prevented me from coming?'

(19a) is the appropriate question for the noun phrase with a relative clause which is a human NP and the Causer in the sentence. On the other hand, (19b) is the appropriate question for the factive nominalization which is a non-human NP having the role of Instrument in the sentence.

Just as there is ambiguity in the interpretation of (1) as a relative clause and as a factive nominalization as in (13), a similar kind of ambiguity may be observed in (2) and (3). A careful reading of the two sentences will show that in addition to the meaning already given showing them to be a factive nominalization, there is another possible meaning as may be illustrated in the sentences:

(20) rírà tí mo ra ìwé dára
'The manner in which I bought a book is good'
(21) kíákíá tí mo ra ìwé dára
'The way in which I bought a book quickly is good'

This second meaning suggests that there is another type of nominalization, a manner nominalization, which is attested in (20) and (21).[4] Proof that this is the case is that the two sentences have variants which are manner nominalizations. Thus (20) has the variant (22), and (21) has the variant (23).

(22) bí mo ṣe ra ìwé dára
'The manner in which I bought a book is good'
(23) bí mo ṣe ra ìwé kíákíá dára
'The way in which I bought a book quickly is good'

It can be seen, therefore, that any sentence of the type (2) and (3) or (20) and (21) containing a reduplicated "verbal noun" or an adverb followed by a sentence introduced by tí is ambiguous as between a factive and a manner nominalization.[5] Thus, any sentence of the form (2) or (20) can be interpreted either as (13a) or (22).

The conclusion from the foregoing is that not all clauses introduced by *tí* in Yoruba are to be regarded as relative clauses. As we have seen, the clauses in (1), (2) and (3) are so introduced, but they are all one variant of a factive nominalization, while (2) and (3) can also be interpreted as a manner nominalization. Only the clause in (1) can be interpreted as a relative clause qualifying a noun head.

One important implication of this finding is that it will no longer be sufficient to use the mere presence of *tí* as evidence of nominal status. In a factive or manner nominalization in which *tí* occurs, it is the whole phrase, and not just the word preceding *tí*, that is a nominal. Where a word preceding *tí* can be interpreted as a noun, this is simply because such a word can be identified independently as a noun in another context. For example, *ìwé* 'book' is a noun in (1) simply because it can be identified as such in (24).

(1) ìwé tí mo rà dára
book that I buy good
'The book that I bought is good'
(24) mo ra ìwé
I buy book
'I bought a book'

In contrast to this, the form *rírà* 'buying' in

(2) rírà tí mo ra ìwé dára
buying that I buy book good
'The buying that I bought a book is good'
i.e. 'The fact that I bought a book is good'

is not present in (24). It only derives from the verb *rà* 'buy' which has to be obligatorily converted into a nominalized form in the factive or manner nominalization. Its occurrence in (2) cannot therefore be taken as evidence that it is a noun. Similarly, *kíákíá* 'quickly' in (3) derives from a basic sentence (25) in which this word functions as an adverb.

(3) kíákíá tí mo ra ìwé dára
quickly that I buy book good
'Quickly that I bought a book is good' i.e.
'The fact that I bought a book quickly is good'
(25) mo ra ìwé kíákíá
I buy book quickly
'I bought a book quickly'

Its occurrence before *tí* in (3) does not, therefore, confer nominal status on it.

It should be clear by now that what happens in this variant of a factive or manner nominalization is the shifting of an element in the sentence to the position before *tí*. In the case of a factive nominalization, the item so shifted is a noun, a verb, or an adverb (with the verb being automatically changed into a nominalized form), and in the case of a manner nominalization, the item shifted is a verb or an adverb. The shifting, of course, imposes a slight emphasis on the item so shifted. Although relativization also involves the shifting of an item to the position before *tí*, the main difference between it and a factive or manner nominalization is that only a noun may be shifted in relativization.

If the arguments and conclusions presented above are valid, there will be need in Yoruba grammar to distinguish firstly between relativization and nominalization. The former involves a head noun and a qualifying clause, while the latter is only a nominal derived by the nominalization of a sentence.[6] Secondly, relativization will have to be seen as a process applicable to nouns only and not to any other word class.

Footnotes

[1] For an example of this type of analysis, see Awobuluyi (1972, 1974).

[2] Keenan (1972:169) refers to this aspect of a restrictive relative clause by saying that such a clause specifies a domain (i.e. 'a larger set of individuals') and a restricting sentence (i.e. 'those members [of the set] which have the property expressed by a certain sentence').

[3] Thompson (1971) has drawn attention to the fact that even restrictive relative clauses have conjoined sentence paraphrases; hence, she proposes conjoined sentences as the deep source for relative clauses. However, Schachter (1972:17-19) has shown that there are certain idioms in English for which such paraphrases are lacking, e.g. 'The headway that we made was satisfactory' (Note that this does not invalidate the point made in respect to sentences (7)-(9) since they are not idioms of any sort). For this reason, both the conjoined sentence derivation and the "matching analysis" which requires identity of NP's are rejected. The proposal that is favoured in this paper is the "promotion analysis" which requires that the relativized NP be moved from an embedded sentence to replace a dummy nominal in the matrix sentence.

[4] This ambiguity is correctly noted in Awobuluyi (1972) although he regards both interpretations as two meanings of the same relative clause. Cf. his earlier position in which he regards sentences such as (22) and (23) as non-instances of a relative clause construction. See Awobuluyi (1967:195).

[5] In Awobuluyi (1972), it is stated that the ambiguity between 'fact' and 'manner' in a sentence such as *lílọ rẹ̀ yà mí l'ẹ́nu* 'The fact that he went surprised me' or 'The manner or way in which he went surprised me' is "lexical rather than structural". On the contrary, I feel that this ambiguity is syntactic relating

to whether what we are dealing with is a factive or manner nominalization. Cf. Katz and Postal (1964:122) who point out that such sentences are "structurally ambiguous between a 'factive' and a 'manner' sense", and Newmeyer (1970:413) who keeps the two interpretations apart by the noun heads 'act' and 'manner' i.e. he derives 'his going' from 'the act of his going' or 'the manner of his going'.

[6] Schachter (1972) points out that relativization and nominalization are both processes of converting sentences into nouns and that the essential difference between the two is that whereas nominalization leaves unaffected the relation of the parts of the underlying sentence to one another, relativization divides the underlying sentential material into two parts--a noun which assumes the role of head and a relative clause which assumes the role of attribute.

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.210-226 (1975)

The Case for a Focus Position in Duala*

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1. Introduction

In recent years, a number of studies have been devoted to showing the cross-linguistic similarities between relativization, focus constructions and WH- (or constituent) questions (see for example, Keenan (1972), Keenan and Hull (1973), Schachter (1973), Takizala (1973)). Keenan and Hull (1973), for instance, show that the syntactic similarities between those constructions come from their underlying logical similarity: first, in all three cases, a condition given by sentence S is imposed on a constituent separated from S; second, all three constructions "presuppose that some member of the world satisfies that condition" (350). Similarly, Schachter (1973) argues that focus and relativization in a number of languages are best analysed as processes involving the 'foregrounding' of an element from an embedded clause to an empty position higher up in the tree.

The purpose of this paper is to provide additional support both for the close relationship existing between the three processes mentioned above and for a movement analysis of relativization. Specifically, we shall present crucial syntactic evidence from Duala[1] that in order to account for the marker _no_, which occurs in a subset of relative, focus, and WH-question constructions, relativization will have to be analyzed as involving not a deletion, but a movement transformation.

The paper is divided into four parts. First we examine focus constructions and provide the simplest explanation for the occurrence of the marker _no_. In section 3 the same process is followed with regards to WH-questions. In section 4 we take up relative clauses and show how a deletion analysis fails to capture an obvious generalization about the marker _no_. Finally, an analysis is suggested which accounts for both _no_ and some other puzzling facts about focus constructions in Duala.

2. Focus constructions

Duala has a very productive process which is used to 'focus' on elements of a sentence. This process is characterized by the invariant morpheme _nde_ as shown below:

(1) a. Kuo a-andi mutowa mwa Njo kiele
Kuo PA buy car of Njo yesterday
'Kuo bought Njo's car yesterday'

(1) b. Kuo̲ *nde* a-andi mutowa mwa Njo̲ kie̲le̲
Kuo *foc*. PA buy car of Njo yesterday
'It's Kuo who bought Njo's car yesterday'
c. mutowa mwa Njo̲ *nde* Kuo̲ a-andi *no* kie̲le̲
car of Njo foc. Kuo Pa buy yesterday
'It's Njo's car Kuo bought yesterday'
d. kie̲le̲ *nde* Kuo̲ a-andi *no* mutowa mwa Njo̲
yesterday *foc*. Kuo PA buy car of Njo
'It's yesterday Kuo bought Njo's car'
e. Kuo̲ a-andi *nde* mu mutowa
Kuo PA buy *foc*. that car
'Kuo *bought* that car'

Sentences (1b) to (1e) show that any of the elements of a sentence can occur as focus of that sentence, if followed by the focusing particle *nde*. In (1b), the focus is the Subject NP, in (1c) it is the Object NP, in (1d) the time adverb and in (1e) the main verb. Note that the 'normal', unmarked word order of the sentences above when no element is syntactically focused on is as in (1a), that is, SVO. Sentences (1b) and (13) follow the normal SVO word order and can stand alone without the particle *nde*. However, (1c) and (1d) where the normal surface order is altered are ungrammatical without the underlined particles *nde* and *no*.

(2) a. *mutowa mwa Njo Kuo a-andi kie̲le̲
car of Njo Kuo PA buy yesterday
b. *kie̲le̲ Kuo a-andi mutowa mwa Njo
yesterday Kuo Pa buy car of Njo

What this shows is that there is a correlation between the preposing of an element from its original postverbal position and focusing. Informally stated, the focus rule says: take a simple sentence; choose the focus of that sentence and place the marker *nde* immediately to its right; if the element chosen as focus is either the Subject or the main verb of the sentence, nothing more needs to be done, as shown by the sentences below:

(3) a. Kuo a tápi jombe̲
Kuo PA tough door
'Kuo touched the door'
b. Kuo *nde* a tápi jombe̲
'*Kuo* touched the door'
c. Kuo a tápi *nde* jombe
'Kuo *touched* the door'[2]

However, if we choose as focus of the sentence any of the constituents which normally occur after the main verb, we can either prepose that constituent together with *nde* (as in (1c) and (1d)) or leave it in its original position, in which case *nde* gets inserted not after the focused constituent, but immediately after the verb. This explains the ambiguity of (3c); in discourse, such constructions present no problem usually since there is often enough information for the appropriate interpretation. Preposing can then be considered a way of disambiguating such sentences when the context does not provide the relevant information.

To summarize, we have seen that focus constructions are marked with the morpheme nde and fall into two classes: those where the focus is the Subject or the verb, and those which have as focus an element occurring to the right of the verb. The former do not involve any movement of constituents, whereas the latter optionally involve moving the constituent on focus, together with nde, to sentence initial position. Of the two classes of focus constructions we have just mentioned, the ones which are of particular interest to us are the ones which involve preposing.

Consider the following pairs of sentences:

(4) a. no tondí nde wa (seto mo)
I like foc. you (not him)
'You're the one I like'
b. wa nde na tondi no
'You're the one I like'
(5) a. Kuo a lom nde telegram (seto leta)
Kuo PA send foc. telegram (not letter)
b. telegram nde Kuo a lom no
'It's a telegram Kuo sent'
(6) a. na timbi nde o mboa ŏnola na na si ta na
I return foc. to home for that I not past I
bene moni
have money
b. oñola na na si ta na bene moni nde na
'it's because I did not have any money that
timbi no mboa
I returned home'
(7) a. mot-a jango a bo nde ni ngila na ngadi
man of hunting PA kill foc that lion with gun
b. na ngadi nde mot-a jango a bo no ni ngila
'It's with a gun that the hunter killed that lion'

The (a) and (b) pairs above are, for all practical purposes, synonymous: they have the same truth value and share the same presupposition and focus. The only syntactic difference between them is that whereas the focused constituent in (a) occurs in its original position (i.e. the position in which it is found in a simple, unmarked sentence), in (b) that constituent has been preposed to sentence initial position. But most important, observe that the morpheme no occurs just in those sentences where the focus is *moved* to sentence initial position. That a dependency relation exists between no and preposing rather than between no and nde is shown by the fact that nde can occur alone just in those cases where no preposing has taken place. The sentences below show that no is obligatory every time there is evidence for preposing and cannot be present when there has been no preposing:

(8) a. na mende tilea wa kiele
I will write you tomorrow
b. mba nde na mende tilee wa kiele
'I will write you tomorrow'
c. *mba nde na mende no tiles wa kiele
d. kiele nde na mende no tilea wa
'I will write you tomorrow'
e. *kiele nde na mende tilea wa
f. wa nde na mende no tilea kiele
'I will write you tomorrow'
g. *wa nde na mende tilea kiele

Sentence (8a) is the normal, unmarked construction; in (8b), the focus is the subject of the sentence; (8c) is ungrammatical because the marker no occurs without there having been a constituent preposed to sentence initial position; the ill-formed strings (8e) and (8g) illustrate cases where preposing has taken place, but without no being inserted; sentences with the same focus in initial position (i.e. (8d) and (8f)) are perfectly acceptable once they have the particle no in post-verbal position.

On the basis of our discussion of focus constructions, this much has been established+ nde is the marker of focus; the no which turns up in the sentences so far considered is not directly related to the focusing particle nde, but rather to the rule which optionally moves a constituent from post-verbal position to sentence initial position when that constituent is the focus element of the sentence. Since the movement is always leftward, let us refer to no as the reflex of the leftward movement of a constituent past the main verb.

Next, we shall consider another type of construction in Duala which involves the particle no, namely WH-questions.

3. WH-questions

Duala has a constituent question morpheme, njika, which can be followed by a noun meaning 'person', 'thing', 'reason', 'time', etc. For the sake of convenience, we shall henceforth refer to njika as WH. The following is a list of the most common WH-words in Duala; some of them also have a shorter form, as indicated on the right:

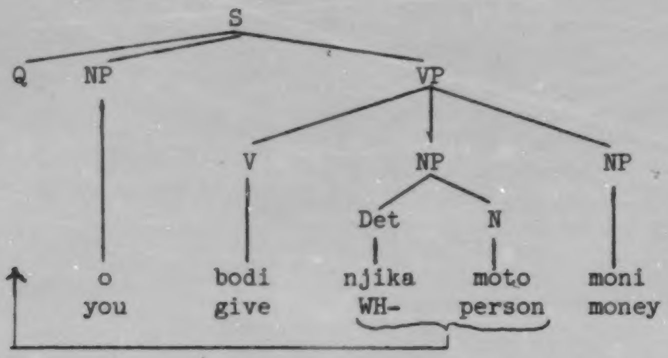
(9) a. njika moto = nja 'who'
WH- person
b. njika lambo = nje 'what'
WH- thing
c. njika wuma = o we 'where'
WH- place
d. njika ponda 'when'
WH- time
e. njika njom 'why'
WH- reason

The sentences below illustrate the use of those words.

(10) njika moto o bodi no moni?
WH-person you give money
'Whom did you give the money to?'
(11) nje wa pula no?
what you want
'What do you want?'
(12) njika wuma Kuo a wele no mulonga?
WH- place Kuo PA put bucket
'Where did Kuo put thebucket?'
(13) njika ponda o wu no o ngando
WH- time you return from dance
'When did you get back from the party?
(14) mwaninga mwa bana o ben no?
how many of children you have
'How many children do you have?'

Assuming, for the time being, that Katz and Postal's (1964) analysis of WH-questions is correct, a sentence such as (10) would be derived from its corresponding declarative, with Q acting as both a semantic and a syntactic marker.

(15)



From the underlying structure above one can derive either the short form (10a) or the long form (10):

(10) njika moto o bodi no moni?
'What person did you give the money to?'
(10) a. nja o bodi no moni?
'Whom did you give the money to?'

In either case, the transformation which relates the structure in (15) to sentences (10) and (10a) is similar to Katz and Postal's T_1: it moves an NP dominating njika (WH-) to sentence initial position. The next thing to account for is the occurrence of the morpheme no. Here again, as was the case with focus constructions, we have a no materializing immediately after the verb, in a sentence where a preposing transformation has taken place. Notice, furthermore, that the movement must be over the main verb, as shown by the fact that when the NP dominating the WH-word is the subject of the sentence, no cannot occur:

(16) a. nje e poedi wa?
what RP happen you
'What happened to you?'
b. *nje e poedi *no* wa
(17) a. nja ń-andi medi?
who RP buy bicycle
'Who bought a bicycle?'
b. *nja ń-andi *no* medi
(18) a. njika njom ń-alane wa o wo?
WH- reason RP take you to there
'Why did you go there?'
b. *njika njom ń-alane *no* wa o wo?
(19) a. njika diboa dí bo mo?
WH- disease RP kill him
'What disease did he die of?'
b. *njika diboa dí bo *no* mo?'
(20) a. mwaniga mwa bato mu poi?
how many of people RP come
'How many people came?'
b. *mwaninga mwa bato mu poi *no*?

The sentences above clearly establish that *no* is the reflex, not simply of a leftward movement to sentence initial position, but of a movement over the main verb. The (b) sentences are ungrammatical because the moved NP does not cross over the verb, since it is the subject of the sentence. We shall not, at the moment, concern ourselves with whether the moved constituent in WH-questions is transported to a position adjacent to Q (as suggested by Katz and Postal (1964)) or whether it actually replaces the Q morpheme (as in Baker (1970), following a suggestion made in Jacobs and Rosenbaum (1968)). The point we want to emphasize is that *no*, in WH-questions, is the marker of a leftward movement transformation over the main verb.

This fact is seen even more clearly if one examines sentences such as the ones below:

(21) a. o wu njika buńa?
you return WH- day
'On what day did you return?'
b. njika buńa o wu *no*?
WH- day you return
'On what day did you return?'
(22) a. Kuo a bodi nja moni?
Kuo PA give who money
'Whom did Kuo give money to?'
b. nja Kuo a bodi *no* moni?
'Whom did Kuo give money to?'
(23) a. o poi jene nja?
you come see who
'Whom did you come to see?'
b. nja o poi *no* jene?
'Whom did you come to see?'

(24) a. Kuo a ben mwaninga mwa bito?
Kuo PA have how many of wives
'How many wives does Kuo have?'
b. mwaninga mwa bito Kuo a ben *no*?
'How many wives does Kuo have?'

The (a) sentences above, which follow the declarative word order, are not echo questions, but legitimate requests for information. The alternation between preposed and non preposed WH-words shows that insofar as WH-movement is a rule of Duala, it is, at least in direct questions, an optional rule. But, most important, observe that the morpheme *no* occurs only in the (b) sentences, that is, those in which WH-movement has applied. The (a) sentences, which follow the declarative word order, do not exhibit a *no*.

As can be adduced from the facts presented above, *no* cannot be explained by the Q morpheme, since WH-movement is optional. Further evidence against trying to explain the occurrence of *no* through Q in Duala comes from an examination of Indirect WH-questions. These constructions differ from Direct WH-questions in one main respect: whereas the latter involve a choice between the declarative word order and the preposing of the questioned constituent, the former involve no such choice; WH-preposing is always obligatory in indirect questions. Compare the following sets of sentences:

(25) a. Kuo en nja?
Kuo see who
b. nja Kuo en *no*?
'Whom did Kuo see?'
c. *na si bi Kuo en nja
I not know Kuo see who
d. na si bi nja Kuo en *no*
'I don't know whom Kuo saw'
(26) a. mama a-andi nje o don?
mother PA buy what at market
b. nje mama a-andi *no* o don?
'What did Mother buy at the market?'
c. *langwea mba mama a-andi nje o don
tell me mother PA buy what at market
d. langwea mba nje mama a-andi *no* o don
'Tell me what Mother bought at the market'

The contrast between sentences (c) and (d) shows that the only permitted word order in indirect WH-questions is the one in which the question-word occurs in initial position in the embedded clause. WH-preposing is therefore obligatory in indirect questions. Predictably, indirect questions with the questioned constituent to the right of the verb in underlying structure will all contain the marker *no* (cf. (25d), (26d)), those in which the questioned constituent *is* the subject in underlying structure will not exhibit a *no*:

(27) a. na si bi nja nu ben ni kalati
I not know who RP have that book
'I don't know whose book that is'
b. *na si bi nja nu ben *no* ni kalati
(28) a. langwea mba nje e poedi wa
tell me what RP happen you
'Tell me what happened to you'
b. *langwea mba nje e poedi *no* wa

What one gets in sentences where the subject is questioned is a relative pronoun (RP). We shall come back to this matter later. Returning to the issue of relating the occurrence of *no* to the question morpheme Q, notice that the obligatoriness of WH-preposing in indirect questions rules out any such relation. Why? Mainly because if we accept Katz and Postal's analysis of Q, we will have to say that indirect questions, unlike direct questions, do not have an underlying Q morpheme. The absence of a Q morpheme, one may want to argue, makes WH-preposing obligatory in Duala. That this solution is clearly wrong is shown by the fact that WH-movement can also apply in direct questions which, presumably, contain a Q in underlying structure. An analysis of questions such as the one in Baker (1970) does not help either since it allows the Q morpheme to occur in the underlying structure of both indirect and direct questions; WH-movement can therefore not be explained through the presence or absence of Q.

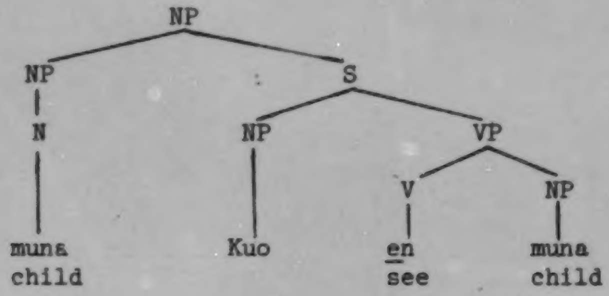
To summarize: We have shown that both direct and indirect WH-questions exhibit a marker *no* which, like the one which occurs in focus constructions, is the result of a movement rule. Given the fact that it never occurs when the questioned constituent is the subject of the clause, it must be the result of a movement past the main verb. Let us now consider the last construction in Duala which also takes *no*, namely relativization.

4. Relativization

Consider the following (b) sentences, which are instances of object relativization:

(29) a. Kuo en muna
'Kuo saw the child'
b. muna Kuo en *no*
'The child Kuo saw'
(30) a. na andi konda
'I bought a chair'
b. konda na-andi *no*
'The chair I bought'
(31) a. Kuo a duwane mutowa kiele
Kuo PA drive car yesterday
'Kuo drove a car yesterday'
b. mutowa Kuo a duwane *no* kiele
car KUO PA drive yesterday
'The car Kuo drove yesterday'

Current practice in transformational grammar (barring differences of detail) would derive a sentence like (1b) from an underlying structure containing coreferent NP's, like the one below:



Relative Clause Formation in Duala would consist of at least the following rules:

(A) Tone Raising on the last syllable of the verb (can apply vacuously)
(B) Deletion of the Object NP under identity with the head noun
(C) Insertion of a marker (no) at the position of the deleted NP.

Of these three rules, only the last two will detain us. Notice that object relativization in Duala does not require a relative pronoun; the pronouns which occur in (29) to (31) are the usual gender agreement morphemes common to most Bantu languages. What is obligatory in object relativization is the presence of the marker no, which must occur in immediate post-verbal position. This is shown by the ungrammaticality of the (b) sentences below:

(32) a. moto na nongone no moni
man I take from money
'The man I took the money from'
b. *moto na nongone moni
man I take from money
(33) a. kalati Kuo a di no o tebedi
book Kuo PA leave on table
'The book Kuo left on the table'
b. *kalati Kuo a di o tebedi
book Kuo PA leave on table
(34) a. esukudu o posi no y-emedi wa
school you choose PA accept you
'The school you chose accepted you'
b. *esukudu o posi y-emedi wa
school you choose PA accept you

Unlike object relativization, subject relativization does not require the marker no; in fact it does not allow no at all. What subject relativization requires is a relative pronoun, which must occur after the head (i.e. the relativized) noun:

(35) a. nu muna a tőndȋ sango
that child PA like father
'That child likes his father'
b. muna nu tőndí sango a sengane̱ mo̱
child RP like father PA listen to him
'A child who likes his father listens to him'
(36) a. diboa di bo̍ mo̱̍
ailment PA kill him
'He died of an ailment'
b. diboa di bő mő̱ di si biane̱
ailment RP kill him PA not known
'The ailment he died of is not known'
(37) a. leta di po̱í kie̱le̱
letter $\left\{\begin{matrix}\text{PA}\\ \text{RP}\end{matrix}\right\}$ come yesterday
'The letter $\left\{\begin{matrix}\text{came}\\ \text{which came}\end{matrix}\right\}$ yesterday'

Because relative pronouns for all noun classes except 1 and 9 are homophonous with pre-verbal agreement morphemes (PA) of the same class, the raised tone on the verb will often be the only marker of relativization. If, however, the last syllable of the verb already has a high tone, the clause will be ambiguous between a relative and a non relative interpretation, as shown by sentence (37).

Returning now to the main issue, we see that the insertion of no in relative clauses will have to be made sensitive to the position in the sentence of the NP which is relativized. We want no to be inserted only when the Object NP is the head of the relative clause and prevent it from occurring when the subject of the clause is the NP "controlling" relativization. Assuming, following the traditional analysis, that Relative Clause Formation involves the deletion under identity of an embedded NP, the Duala particle no will have to be analyzed as the residue of the deletion of the Object NP

The account of no presented in the three preceding sections leads to the rather strange consequence that Duala has two morphemes no, which just happen to share the same phonological representation and the same syntactic post-verbal position: one is inserted to mark the movement of a constituent from post-verbal to sentence initial position, the other is the residue of the deletion of an Object NP. Such an analysis clearly misses an obvious generalization about the syntactic behavior of no; by deriving it through two entirely different syntactic processes, one would implicitly be relegating to mere accident the fact that that morpheme, in the three constructions examined:

(A) occurs in exactly the same position
(B) never occurs in clauses where the element in initial position is also the subject, i.e. subject relativization, WH-questions involving the subject, focus of the subject

(C) is always found in constructions which have, in clause initial position, constituents normally found post-verbally such as objects, adverbials and other types of modifiers.

Notice, furthermore, that in two of the three constructions in which it occurs, namely WH-questions and Focus constructions, no can be accounted for in a unitary manner as the result of a movement rule. Given the fact that it is not so much the different behavior of no in Relativization as it is the assumed difference between the latter and the previous two constructions which leads to positing two no, capturing the generalization about the occurrence of that morpheme entails re-analyzing Relativization in terms of a movement rule. We do not here consider the other logical possibility, which would be to try and analyze both WH-questions and Focus constructions in terms of a deletion.

5. The Focus Position

In this section, we will show how facts such as the ones presented in the three preceding sections can give a natural explanation within a theory which allows the grammar of Duala to generate what we call, for lack of a better term, an optional Focus position.

Let us start with Focus constructions by considering the sentences below.

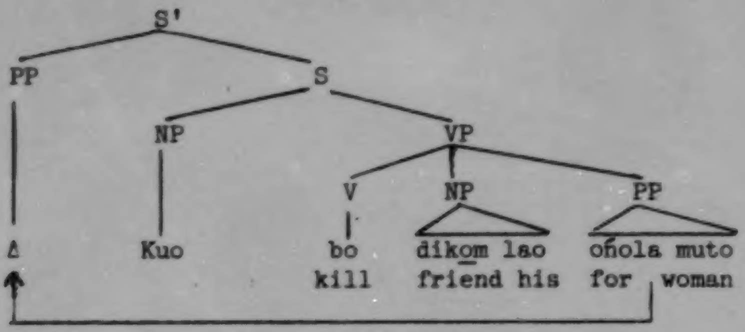
(38) a. kiele nde Kuo a wu no
yesterday foc. Kuo PA return
'It's yesterday that Kuo returned'
b. oñola muto nde Kuo a bo no dikom lao
for woman foc. Kuo PA kill friend his
'It's because of a woman that Kuo killed his friend'
c. tondo longo la loa bato nde dí lingisé mba
liking your to insult people foc PA madden me
'It's your liking to insult people which made me mad'

In the sentences above, different types of constituents appear in focus position: in (38a), the focus is a time adverb; in (38b), it is a prepositional phrase, and in (38c) a whole sentence. To account for such sentences, the Phrase Structure rules of Duala must optionally generate nodes like AP, NP, PP, and S in a position immediately to the left of the subject position, through a rule such as the one below,

$$S' \rightarrow (\text{Focus})\ S$$

where 'Focus' serves as an abbreviation for any of the major phrase nodes. A sentence such as (38b) which has as its focus a PP, would come from a structure like the one following:

(39)



Two independent processes would relate the structure in (39) to sentence (38b): one, let us call it *Cleft Formation*, moves any constituent, except VP, from under S to the empty position in S' and inserts *nde* immediately after that constituent. The second process, which is simply a more general fact about Duala, inserts the marker *no* after the verb any time a constituent dominated by VP is moved to pre-subject position. The derivation of (38a) is identical to that of (38b), except that the moved constituent is an adverb, not a prepositional phrase. Notice, however, that (38c) only undergoes cleft formation (vacuously) and not *no*-insertion because the structural description of that transformation is not met.

Next, consider WH-questions; it is interesting to note that WH-preposing, which relates the following sentences,

(40) a. wa pula nje?
you want what
'What do you want'
b. nje wa pula *no*?
what you want
'What do you want?'

cannot co-occur with clefting within the same cluase, as shown by the sentences below.

(41) a. Kuo a-andi nje kiele
Kuo PA buy what yesterday
'What did Kuo buy yesterday?'
b. nje Kuo a-andi *no* kiele
what Kuo PA buy yesterday
'What did Kuo buy yesterday?'
c. kiele *nde* Kuo a-andi *no* nje
yesterday *foc* Kuo PA buy what
'It's yesterday Kuo bought *what*?'
d. *kiele *nde* nje Kuo a-andi *no* (*no*)
yesterday *foc*. what Kuo PA buy

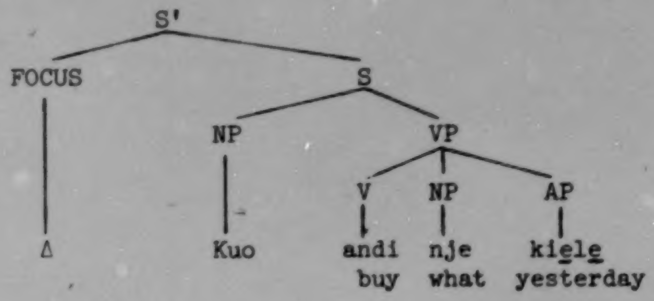
Sentences (41b) and (41c), which respectively involve WH-movement and Cleft formation, are grammatical, with (41c) being interpreted as an echo question;on the other hand, (41d) in which *both* Cleft formation and WH-movement have applied is totally unacceptable.

Likewise, sentences (42b) and (42c) are clearly ill-formed, whereas (41a) is grammatical:

(42) a. nja ń-andi mutowa mwa Kuo
who RP buy car of Kuo
'Who bought Kuo's car?'
b. *nja mutowa mwa Kuo *nde* ń-andi *no*
who car of Kuo *foc*. RP buy
c. *mutowa mwa Kuo *nde* nja ń-andi *no*
car of Kuo *foc*. who RP buy

The fact that Clefting and WH-movement are mutually exclusive will follow naturally if we assume that the position to which constituents are moved in both WH-movement and Clefting is the same. By generating a single position to the left of the subject position, we automatically rule out the possibility of generating the ungrammatical sentences (41d) and (42c). Consider, for instance, the sentences in (41): they would have the common underlying structure below:

(43)



Assuming, as we stated earlier, that Focus can be expanded as any of the major phrase node categories, let us consider the case where Focus dominates the node NP. In that case, either the subject *Kuo* or the Object *nje* in (43) can be moved to the NP position dominating the null symbol Δ. If we move the subject, and insert *nde* after it, we get the cleft sentence (44).

(44) Kuo *nde* a-andi nje ki*e*l*e*
'It's Kuo who bought *what* yesterday?'

which, like (41c), is interpreted as an echo question. Alternatively, we can move the Object NP *nje* 'what' to the focus position, yielding (41b). Interestingly, however, we cannot perform both operations one after the other: the result would be the ungrammatical string (45).

(45) *nje Kuo *nde* a-andi *no*
what Kuo *foc*. PA buy

It seems clear that having the rules of WH-movement and Cleft formation move constituents to the same sentence initial position explains why the rules are mutually exclusive within the same clause. As shown by sentences (41c), and (44), the co-occurrence restriction is not between WH-question and Clefting, but between the *preposing* of the WH-word and Clefting.

Let us finally turn to relativization. We have already presented some facts, based on the behavior of the particle *no*, which make it necessary to analyze relativization in Duala in terms of a preposing rule. We argued that the standard analysis of relativization would fail to capture a very significant generalization about the particle *no*, claiming in fact that that morpheme is triggered by two rules as formally different as a deletion rule and a movement rule. We believe that the generalization which needs to be captured in Duala is that relativization, just like WH-movement and Clefting, involves the movement of some constituent to clause initial position. Furthermore, the rules which move those constituents move them to the same position, the position we have called Focus. The main consequence of such an analysis is obvious: assuming that the movement rules involved are structure-preserving (in the sense of Emonds (1969) and Bowers (1973)), Clefting and Relativization will be mutually exclusive within the same clause. Consider the following sentences:

(46) muna Kuo a-alane *no* o dokita
child Kuo PA take to hospital
'The child Kuo took to the hospital'

(47) konda Kuo a-andi *no*
chair Kuo PA buy
'The chair Kuo bought'

they are unambiguously interpreted as relative clauses, although they do not exhibit an explicit relative marker. However, if we add the morpheme *nde* after the head noun, these sentences lose their relative clause interpretation and automatically become Cleft constructions:

(48) muna *nde* Kuo a-alane *no* o dokita
'It's a child that Kuo took to the hospital'

(49) konda *nde* Kuo a-andi *no*
'It's a chair that Kuo bought?

if we add a verb to the two sentences above (i.e. forcing a relative clause interpretation on them), they become ungrammatical:

(50) *muna nde Kuo a-alane *no* o dokita a boa
child *foc*. Kuo PA take to hospital PA be sick

In a similar fashion, WH-movement and Relativization are mutually exclusive, as shown by the sentences below:

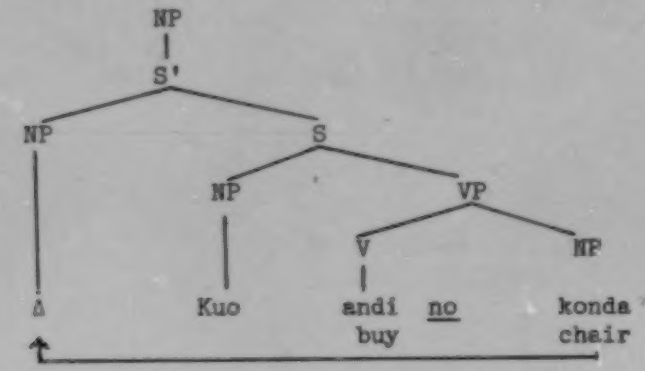
(51) a. *njika buña mutowa Kuo a-andi *no*
WH- day car Kuo PA buy
b. *mutowa njika buña Kuo a-andi *no*

compare with the well formedness of the following sentences, in which only one movement has taken place:

(52) a. njika buña Kuo a-andi no mutowa
WH- day Kuo PA buy car
'When did Kuo buy a car?'
b. mutowa Kuo a-andi no njika buña
car Kuo PA buy WH- day
'A car Kuo bought when?' (dubitative)

The facts above lend syntactic support to our proposal to derive relative clauses by a rule which not only moves the relativized NP leftward, but moves it to the same position as the one needed for WH-movement and Clefting. A relative clause such as (47) would come from a structure like the one below:

(53)



Relative clause formation can simply be seen as a rule which moves an NP from an embedded S to an empty NP position under S'. The independently needed rule of no-insertion ensures, in the case of (53), that no is inserted after the main verb since the element moved originates in post-verbal position. Notice also that the structure above also underlies subject relativization; in other words, in our analysis, the difference between subject and object relativization lies, not in their respective underlying structures, but in which NP is moved to fill the empty focus position. The only constraint to which these movement rules are subjected is that there be no "doubling" of phrase structure positions at any level (see Emonds (1969:section II.6) for a discussion of doubly-filled and empty nodes). This prevents moving a constituent to a position which has already been filled.

6. Conclusion

We hope to have shown in this paper that in order to explain certain syntactic similarities, in particular with respect to the occurrence of the marker no, between relativization, clefting, and WH-questions, it is necessary to assume that they all involve the leftward movement of a constituent to sentence initial position. Given the fact, which has been noted in the literature, that these processes involve the foregrounding, semantically speaking, of the preposed constituent, we submitted that the PS rules of Duala generate a focus position through the rule S' → Focus S.

If the analysis proposed here is correct, it raises some serious problems concerning the existence of a level of Deep Structure. In the account of relativization presented above, for instance, both Subject and Object relativization have the same underlying structure, and the operations which apply to this structure determine the semantic interpretation assigned to the sentence; one can therefore not separate syntax from semantics, since the two go side by side. This, of course, goes against both the Deep Structure and the meaning preserving hypothesis. Next, consider the fact that WH movement is optional in direct questions, but obligatory in indirect questions; despite the fact that we did not provide a formal statement of the rule in this paper (see Epée (forthcoming) for a more detailed analysis), it seems clear that it will have to "see" what is on the next cycle to know whether to apply optionally or obligatorily. Notice that the Q morpheme can be of no help because it is present in both types of questions (see Baker (1970)). Allowing the rule of WH-movement to use information from the next cycle is clearly against the principle of the syntactic cycle.

Although several aspects of the constructions discussed were not fully explored, and the movement rules not stated more formally, we believe that the main argument of this paper, namely that relativization, like clefting and WH-movement involves a movement rule, is correct. Further research is needed to state the particulars of the rules involved, and precisely how they interact with other movement rules in the language.

Footnotes

*I wish to thank John S. Bowers for many helpful suggestions during the writing of this paper. Thanks are also due to Wayles Browne III and Joseph Grimes for discussing an earlier version of the paper with me. All remaining inadequacies are due to my own stubbornness.

[1] Duala is a Bantu language spoken in the South of Cameroun.

[2] This sentence is ambiguous; on one reading the focus is jombe 'door', in which case a possible tag is ...seto winda 'not the window'. The other reading, where the main verb is the focus, is considered here. We shall return to this type of ambiguity shortly.

[3] The change in the final vowel, from tilea to tilee is a general phenomenon with verbs ending in -a. The change occurs in the three constructions under discussion when the verb is in the present tense or when it is embedded under the future auxiliary mende 'will'.

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Focus and Topic in Gude*

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1. Introduction

This paper discusses the phenomena of focus and topicalization as they occur in Gude. The Gude language is spoken in Nigeria by people living south and east of Mubi in Sardauna Province, North-Eastern State, and by people living in contiguous parts of Mokolo and Guider Provinces in Cameroon. Geographically, the Gude speaking area forms a square 18 miles to a side with Mubi town at the north-west corner. The number of speakers is difficult to determine. Reasonable estimates vary from 40,000 to 80,000 speakers. Approximately two thirds of the Gude speakers live in Nigeria. Gude has been classified by a number of scholars as belonging to the Chadic family of the Afro-asiatic languages. It is in the Bata group of the Biu-Mandara branch. No account of focus and topicalization has yet been published for the Bata group and it is hoped that these data from Gude will be of interest to those engaged in the reconstruction of Proto-Chadic syntax and to those interested in more general questions relating to focus and topicalization in natural language.

2. Focus constructions

Focus constructions have been identified and discussed by many writers, among them Kuno (1972), Schachter (1973), Keenan and Hull (1973) and Gundel (1974). By the term focus construction, I am referring to sentences like (1)-(3):

(1) The one I saw was John. (pseudo-cleft)
(2) It was John that I saw. (cleft)
(3) I saw John. (emphatic stress)

It has often been noted that focus constructions have presuppositions associated with them and that they are appropriate answers for Wh-questions which share those presuppositions. For example, (2) carries the presupposition that the speaker saw someone and is an appropriate answer to the question "Who did you see?" What I am calling focus constructions have been referred to by various authors as focus, emphasis, and forgrounding. I trust that examples (1)-(3) are sufficient for the reader to identify what I mean by focus construction.

In (4) and (5), we see examples of normal non-focus word order in Gude.

(4) Declarative verbal sentences (surface word order)

ASPECT VERB SUB D.O. DIR. I.O. (ADV*)
Ex. agi bələ-nə nə John tə bwaya əndzii
Lit. ASPECT kill John leopard now
'John is killing a leopard now.'

(5) Declarative non-verbal sentences (surface word order)

PRED SUB (ADV*)
Ex. nwanwu nə John əndzii
Lit. a chief John now
'John is a chief now.'

Notice that the nə preceding 'John' is a preposition marking subjective case and the tə preceding 'leopard' is a preposition marking objective case. In order to limit the length of this paper, we will restrict ourselves to consideration of positive verbal sentences related to example (4).

There are two distinct types of focus constructions in Gude, which I will here refer to as Types I and II. Candidates for focus element include any of the constituent items listed in (4), excluding the ASPECT particle, in other words the VERB, SUB, D.O. DIR., I.O., and any of the possible sentence adverbs. Examples of the various possible focus elements in Type I constructions are given in (6a) through (6d). These are to be contrasted with (4). In (6a) focus is on the subject, in (6b) on the direct object, in (6c) on the verb, and in (6d) on the adverb.

Focus Constructions--Type I.

(6) a. John ci a-bələ bwaya əndzii
Lit. John ASPECT kill leopard now
'John is killing a leopard now.'
b. tə bwaya ci John a-bələ əndzii
Lit. leopard ASPECT John kill now
'John is killing a leopard now.'
c. bələ-nə ci John a-bələ tə bwaya əndzii
Lit. killing ASPECT John kill leopard now
'John is killing a leopard now.'
d. əndzii ci John a-bələ tə bwaya
Lit. now ASPECT John kill leopard
'John is killing a leopard now.'

The surface structures of Type I focus constructions contrast with those of simple non-focus sentences in a number of ways: first, the focus element is found in initial position in the focus construction, preceding the ASPECT. Secondly, the ASPECT particle is represented by a distinct allomorph in the focus construction. The ASPECT particle allomorphs are displayed in (7):

(7)

	Declarative	Focus
CONTINUATIVE	agi	ci
POTENTIAL	ka	nə
COMPLETIVE	kə	∅

The allomorphs in the first column are found in simple non-focus sentences and the allomorphs in the second column in focus constructions. Thirdly, there is a general verb subject inversion, so that the order of constituents in the focus construction is FOCUS-ELEMENT, ASPECT-PARTICLE, then SUB preceding VERB, etc. Fourthly, the focus element occurs with the preposition appropriate to the position it would hold in normal non-focus word order. Thus, in (6b) the initial preposition tə preceding the focus element is the direct object marker appropriate to the role it would have in non-focus sentence (4). Fifthly, there is no trace of the focus element to be found in the corresponding position it would hold in normal word order We see that Type I focus constructions differ radically from non-focus sentences.

The second type of focus construction we will discuss has the overt structure of a non-verbal sentence.[1] The structure of non-verbal sentences is exemplified in (5) above. We see that the constituent order in non-verbal sentences is PRED SUB (ADV*). The nə before John in (5) is a preposition marking subjective case. Examples of possible Type II focus constructions are given in (8a) through (8d). The examples have been chosen so that they are semantically equivalent to the corresponding Type I examples (6a) through (6d). If one were to invert the PRED SUB order in (8a) through (8d) and insert the English verb to be before the PRED the result would be an English pseudo-cleft sentence. In (8a) focus is on the subject, in (8b) on the direct object, in (8c) on the verb, and (8d) on the adverb.

Focus Constructions--Type II

(8) a. John nə əndə-tə ci a-bələ tə
John the one (who) ASPECT kill
bwaya əndzii
leopard now
'The one that is killing a leopard now is John.'

b. bwaya nə sə-tə ci John a-bələ əndzii
leopard thing (which) John kill now
'The thing that John is killing now is a leopard.'

c. bələ-nə nə sə-tə ci John a-da tə bwaya
killing thing ASPECT John do leopard
əndzii
now.
'What John is doing to a leopard now is killing (it).'

d. əndzii nə saa'i-tə ci John a-bələ tə bwaya
now time ASPECT John kill leopard
'When John is killing a leopard is now.'

Wh-questions and relative clauses are syntactically similar to Type I focus constructions. Wh-questions are exemplified in (9a) through (9d). Again the examples are constructed so as to correspond to the focus constructions above.

Wh-questions

(9) a. Wu ci a-bələ tə bwaya əndzii kwa
Who ASPECT kill leopard now Q
'Who is killing a leopard now?'

b. tə mi ci John a-bələ əndzii kwa
what John kill now Q
'What is John killing now?'

c. Mi ci John a-da tə bwaya əndzii kwa
What do Q
'What is John doing to a leopard now?'

d. guci ci John a-bələ tə bwaya kwa
whe[illegible] Q
'When is John killing a leopard?'

Examples of relative clauses are found embedded in (8a) through (8d). A detailed comparison of these structures is beyond the scope of this paper. It will suffice to say only that Wh-questions, relative clauses, and Type I focus constructions look very similar and contrast with non-focus sentences in the same ways. Keenan and Hull (1973) have pointed out that such a similarity between Wh-questions, relative clauses, and focus constructions is quite common in languages of the world.

As regards the derivation of focus constructions, Type II seems to be accounted for by the rules which would be needed to derive ordinary non-verbal sentences. As we noted before, the surface structure of Type II is indistinguishable from non-verbal sentences. However, the surface structure of Type I is not at all obvious. I suggest that we assume the surface structure to be that of FOCUS-ELEMENT somehow adjoined to the left of a SENTENCE. If that is the case, how might this surface structure be derived? There are a number of alternative solutions.

One analysis might be to derive Type I constructions from sentences with underlying non-focus constituent order. These sentences would have a [+EMPHASIS] feature attached to the focus element. A movement rule would then carry the focus element to the front of the sentence and trigger all of the appropriate changes. A movement rule, however, forces us to make ad hoc adjustments, and an underlying sentence with a [+EMPHASIS] feature attached to some node would not seem to be an appropriate semantic structure. Depending on one's favorite syntactic theory, one would need either an ad hoc mapping from a semantic representation to this intermediate shallow structure, or alternatively, an ad hoc mapping from this deep structure to some semantic interpretation. A movement rule would also deny any relationship between Type I and Type II, and it would not explain why the focus element appears as initial element in the sentence. Furthermore, a movement rule would not account for the syntactic similarity noted earlier between relative clauses and Type I constructions, such as the form of the ASPECT particle, VERB SUB inversion, etc.[2]

A second analysis might be to derive Type I constructions from embedded questions. This proposal would be analogous to certain proposals which have been made for English clefts and pseudo-clefts.

This proposal is rather weak since there is little in the surface form of Gude focus constructions that would suggest their being derived from embedded questions.

A third analysis, and the one I believe to be correct, would be to derive Type I from semantically equivalent Type II. This would be analogous to a proposal to derive English cleft sentences from pseudo-clefts. Consider (8a). In Type II example (8a), the SUB consists of a head noun *əndə-tə* meaning *the one* and a modifying relative clause. Now consider (6a). To derive (6a), the Type I equivalent, from (8a) we need only delete this head noun and its case marking preposition *nə*. This deletion leaves us with the required string of elements and with a plausible surface structure. As for changes in the ASPECT particle, VERB SUB inversion and so forth, these changes would have taken place in the formation of the relative clause a cycle earlier than the optional deletion. Thus, the syntactic similarity between Type I and relative clauses is elegantly accounted for.

The only apparent counterexample to this deletion proposal is the presence of prepositions with focus elements in certain Type I constructions but not in Type II. For example, note the preposition *tə* in (6b). It is a preposition marking objective case, and is not present in (8b). I think it is necessary to resolve this problem with a rule which would move the appropriate preposition from the relative clause embedded in the subject and attach it to the predicate noun. We encounter an analogous problem if we try to derive English cleft sentences from pseudo-clefts. Compare (10a) through (11b):

(10) a. The place where I saw John was Boston. (pseudo-cleft)
b. The place I saw John in was Boston. (pseudo-cleft)
(11) a. It was Boston that I saw John in. (cleft)
b. It was *in* Boston that I saw John. (cleft)

Most English speakers seem to accept (10a) in which the predicate noun *Boston* occurs without any preposition. Some speakers will accept (10b). For those speakers, (11a) is also acceptable. I hope that those who do not find (10b) or (11a) acceptable will agree that the offending preposition seems only to be non-standard or redundant but is not objectionable on semantic grounds. Finally, most speakers seem to accept (11b). In (11b) the preposition occurs with the noun *Boston*. If (11b) derives from (10a) or (10b), then why does the preposition *in* appear before the predicate noun in (11b)?

I assert that the proposed Gude rule copying the preposition out of the relative clause up onto the predicate noun is not *ad hoc* and in fact is required to explain the derivation of (11b). Thus, my proposal is to derive Type I focus constructions from Type II by deletion and preposition movement.

3. *Topicalization*

A few sketchy accounts of topicalization in Chadic languages have appeared, specifically the works of D. Burquest (1972), P.

Newman (1971), and R. Schuh. However, I suspect that topicalization in Chadic languages is probably far more common and widespread than reports would suggest.

In a topicalized Gude sentence, such as (12a), the topic, in this case John, is prementioned. The topic is bracketed by pauses, and is optionally preceded by the marker ma. The topic is followed by a comment-sentence in which the topic-element is often pronominalized or deleted. Previous accounts of topicalization in Chadic languages have been limited to object fronting, but examples (12a) through (12d) show that for Gude the same constituent items which were candidates for focus element are also candidates for topic.

(12) a. (ma) John (-a), agi bələ-nə nə ci tə bwaya əndzii
he
'(As for) John, he is killing a leopard now.'
b. (ma) bwaya (-a), agi bélə-nə nə John tə ci ndzii
it
'(As for) the leopard, John is killing it now.'
c. (ma) bələ-nə (-a), agi bələ-nə nə John tə bwaya əndzii
'(As for) killing, John is killing a leopard now.'
d. (ma) əndzii (-a), agi bələ-nə nə John tə bwaya
'(As for what's happening) now, John is killing a leopard.'

4. Conclusion

Topic should not be confused with focus element. The two are syntactically and semantically distinct. I have already illustrated the syntactic differences. The semantic difference is easily understood if we consider the Prague School notions *theme* and *rheme*. The theme (or topic) contains old discourse information. What we have called topic in this paper corresponds to the theme, and what we have called focus element corresponds to rheme.[3] Topicalization is a means of overtly marking what the sentence is about. Consider the gloss for (12a): 'As for John, he is killing the leopard.' In (12a) the sentence is about John. John is the theme. Now compare the gloss for (6a): 'John is killing a leopard.' This sentence is telling us who killed the leopard. The person who killed a leopard is the theme of the sentence. For focus element John is not the theme.

Footnotes

*This brief paper is based on data collected and tested in Nigeria between July 1970 and June 1974 while I was studying Gude under a cooperative agreement between the Institute of Linguistics (a branch of the Summer Institute of Linguistics, Inc.) and Amadu Bello University.

This paper was also produced with the assistance of a concordance of Gude texts made by computer at the University of Oklahoma under NSF grant GS-1605.

[1] By non-verbal sentence, I am referring to the class of sentences we usually think of as copula sentences, but in the case of Gude there is nothing corresponding to a copula.

[2] Movement rules are not involved in Gude relative clause formation, but there is evidence for optional deletion.

[3] The notions are not equivalent however. A sentence may have a theme without having an overt 'topic', and a sentence may have a rheme without having a focus element (cf. Gundel 1974).

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.234-239 (1975)

Predicate Clefting in Afro-European Creoles*

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1. Introduction

(1) Iz tɔk a tɔkɪn tʊ ɔl yu, lɪsn tʊ mɪ na. (Trinidadian)

The above sentence is a good example of a type of clefting which is common to most, if not all, of the Afro-European Creole languages, and which is found in many Niger-Congo languages. It is not, however, found in any of the European languages which are lexically related to these Creoles. In this paper we will examine this structure comparatively in greater detail.

2. Predicate clefting

One sentence as it occurs in a representative sampling of Creoles, as well as in three Niger-Congo languages (each from a different sub-family), is:

(2) a. Iz wʌk i wʌkɪn. (Trinidadian)
b. Iz wʌk ɪm a wʌk. (Jamaican)
c. Na wok i de wok (so). (Krio)
d. Se travay l(i)ap travay. (Haitian)
e. Ta traha e ta traha. (Papiamento)
f. Kɨbulɔ kɔmɔ bulɔ (yaŋ). (Temne)
g. Iṣẹ l'o nṣẹ. (Yoruba)
h. Na wʌk i de wʌk. (Nigerian Pidgin)
i. Ne koruta ekoruta (we:ra). (Kikuyu)

The nearest English equivalent to which would be:

'He's *really*, or, he's *actually* working.'

There are two things to be noted about these structures: the pragmatics of their use and their syntax. Pragmatically, these sentences are a type of emphatic. They underline the fact that the subject is actually performing the action mentioned, or is performing it to a marked degree. They are frequently used as exclamations of wonder or astonishment. They are not primarily intended to focus on the action of the verb or to differentiate it from that of some other possible verb as in English sentences of the type:

(3) What he is doing is working, not sleeping.[1]

With respect to the syntax, the first thing which should be noted is that in all the languages from which we have cited examples, the structure is essentially the same. There is a copying of the verb from its normal sentence position to the left, and the verb is preceded in most cases by what appears to be a copula-like element. In each case this copula-like element is one of limited distribution in its own language. Even those Ka-type languages[2] which always require that verbs in sentences of real predication be accompanied by a tense/aspect marker, only use the bare verb stem in the leftward copy.

As one could predict, exactly the same structure is found with adjectives:

(4) a. Iz tɔl i tɔl. (Trinidadian)
b. Iz tal ɪm a tal. (Jamaican)
c. Na laŋga i laŋga so. (Krio)
d. Se ro li ro. (Haitian)
e. Kbɔl k(a) ɔbɔl yʌŋ. (Temne)
f. Gíga l'ó ga. (Yoruba)[3]

What this means is that he is tall, that he is not wearing high heels. It is clear that these sentences are emphatic and not simply declarative.

In addition to the predicate clefts which we have already described, Creoles also possess typical NP focus clefting:

(5) a. i. Iz Jɑn dat dɪd kɪk Miɛri. (Trinidadian)
'It's John who kicked Mary.'
ii. Iz Miɛri Jɑn dɪd kɪk.
'It's Mary who John kicked.'
b. i. Na Olu na ɪm Mɛriam bɪn slap. (Krio)
'It's Olu that Mary slapped.'
ii. Na Mɛriam na ɪm bɪn slap Olu.
'It's Mary that slapped Olu.'
c. i. Sɛ zamili Piɛ rɛme. (Haitian)
'It's his friend that Peter likes.'
ii. Sɛ Piɛ ki rɛme zamili.
'It's Peter that likes his friend.'
d. i. Mayaŋ kɔnɔ Amɛŋ sap. (Temne)
'It's Maya that Amy beat.'
ii. Amɛŋ kɔnɔ sap Mayaŋ.
'It's Amy that beat Maya.'

What is noteworthy here is that the structure of the focusing cleft varies between languages. In fact, VP focus clefting, of the type:

(6) What he did was write the paper.

cannot even occur in the Niger-Congo languages which we have checked; in addition, these sorts of clefts vary in structure among the various Creoles. This is in decided contrast to the emphatic type of predicate clefting which we were discussing earlier which shows a singular uniformity of structure throughout Creole-dom.

Clearly, focus clefting and emphatic clefting differ not only pragmatically but also in their syntax. The sentences given in (5) are rather complex so that it is difficult to see what is happening, but if we look at the simplest type of NP focus clefting:

(7) a. Iz a tiča i ɪz. (Trinidadian)
b. Na tiča i bi. (Krio)
c. Sɛ profesɛ li yɛ. (Haitian)
'What he is is a teacher.'

we can see the syntactic difference: focus clefting involves a chopping transformation, and not the copying transformation of the emphatic cleft, that is, we do not find:

(8) a. *Iz a tiča i ɪz a tiča.
b. *Na tiča i bi tiča.
c. *Sɛ profesɛ li yɛ profesɛ.

In this paper we are not discussing focusing clefts as in (5) and (7), but rather the emphatic clefts where we find a uniform structure in all the Creole and Niger-Congo languages which we have checked. An interesting condition on this type of emphatic clefting is that it can only occur on the verb of the main S. Thus one cannot get:

(9) *Na wok a se i de wok. (Krio)

as an emphatic cleft. In order to emphasize the verb of the lower S it is necessary to do the emphatic cleft on the verb of the higher S. Thus we do get:

(10) Na se a se i de wok. (Krio)
'I said that he is really working.'

It should be observed here that even though (9) is starred as an emphatic, it does have a reading in that it is in itself an emphatic movement transformation from:

(9) a. A se "Na wok i de wok."

That this is the correct analysis is shown by the fact that no sentences parallel to (9a) can be found with verbs like 'know' or 'believe'.

Now, what remains to be determined is the syntax of these sentences. The first question which must be answered is: What is the copula-like form which introduces the copied element, that is, the verb or adjective. If one examines the other sentences in which this form is used in the various languages, it is clear that its primary function is to serve as a Noun Phrase Introducer. Thus it is also found in NP-bə-NP sentences of the type:

(11) a. Mi frɛn ɪz a dɔkta. (Trinidadian)
b. Mi frem na dakta. (Krio)
c. Zami mwę se daktɛ. (Haitian)

That is, the sentence-type which establishes class-membership and the predication of identity:

(12) a. Da man de ɪz mi papa. (Trinidadian)
b. Da man de na mi papa. (Krio)
c. Moun sa-a se papa mwę. (Haitian)

The Krio 'na' which appears here is not to be confused with the preposition 'na' which occurs in most of the Creole languages. Here are some examples of its use.

(13) a. i de na im rum. (Krio)
b. Li na cham ni. (Haitian)
'He is in his room.'

The first thing to be noticed then, about the syntax of the emphatic cleft is that the copy of the verb base has lost its verbal nature, that is, has ceased to be a verb. This is shown by the fact that the copied form can never co-occur with a tense/aspect marker. Thus in Trinidadian you get (14a) and not (14b).

(14) a. Iz wʌk i wʌkɪn.
b. *Iz wʌkɪn i wʌkɪn.

If the verb is transitive the copy cannot co-occur with the object. Thus we find, also in Trinidadian (15a), but not (15b).

(15) a. Iz lʌv Jɑn lʌv Miɛri.
b. *Iz lʌv miɛri Jɑn luv Miɛri.

Since the copy has lost its verbal nature and is introduced by a form which otherwise only serves to introduce NP's, the only possible conclusion is that the copy has become nominalized.

Any attempt to provide a detailed, formal description of the syntactic processes involved in the derivation of these emphatic clefts runs into the morass of conflicting theories about the derivation of clefts in general. Even though these are not equivalent to either the English clefts or pseudo-clefts, they are nevertheless a type of cleft and their analysis must of necessity be informed by the problems inherent in all analyses of general clefting processes. This means that a simple solution which merely extracts a copy of the verb and moves it to sentence initial position is necessarily unsatisfactory. Such a solution would fail to provide any explanation for the nominalization of the verbal copy and the obligatory introduction of what we have termed the nominal introducer, -*iz*, *na*, *sɛ*, etc.

In the underlying representation of the emphatic cleft there must be more structure, of some sort, present than there is in the corresponding simple unemphatic sentence.

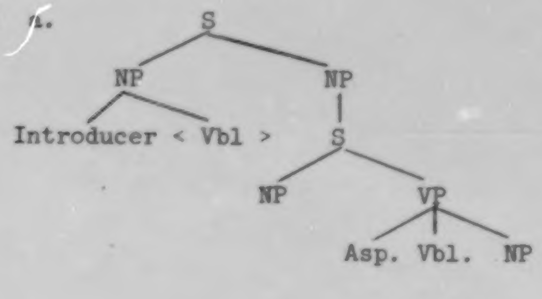
Some hint of the nature of the underlying structure one must postulate can come from the fact that, as we pointed out before, this type of clefting cannot occur on verbs of embedded sentences as we saw in (14b) and (15b). In all Creole languages there is a general constraint that there can be no transformation which moves the subject from its position immediately preceding the verbal complex--that is, the verb and its associated tense/aspect markers. We would suggest that the converse of this constraint, in a somewhat weaker form, accounts for the fact that the emphatic cleft cannot be performed on the verb of the embedded sentence. That is, just as the subject cannot be moved away from its verb, so too the verb, or its copy, cannot be moved very far from its subject. If one were to cleft on the verb of the embedded sentence, thus moving it to sentence initial position, then the NP immediately following would not be the underlying subject of the clefted verb and hence the sentence could not be interpreted, a major constraint of these languages having been violated.

3. Conclusion

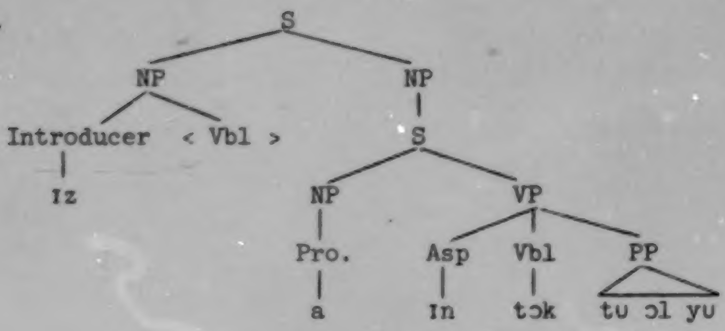
Since we have shown that the copy of the verb is a nominalization and hence dominated by an NP, and since the simplex sentence in itself is embedded in the major sentence which is the emphatic cleft, then the logical conclusion is that the emphatic cleft is itself a nominal sentence.

Although this anlaysis necessitates the generation of an unfilled node, this poses no problem since the node can only be filled by the verb or predicate adjective of the simplex sentence and therefore there is no need for the element being copied to be marked or indexed in any way. Therefore the underlying structure which we would propose for the Creole emphatic clefts, exemplified by our opening clause, is:

(16) a.



b.



ɪz tɔk a tɔkɪn tʊ ɔl yʊ

Footnotes

*We would like to thank Amy Myers, John Ogundipe, Beatrice L. Hall, and R. M. R. Hall for their comments on previous versions of this paper.

[1] One notable exception to this is in Trinidadian where both uses are equally accepted.

[2] We are extending the term Ka-type languages, proposed by Goodman (1964:17 and 83 ff.) as a primary division of the French-based Creoles, to the general domain of Afro-European creole languages, cf. Taylor 1971, where this distinction is implicit. Basically, the Ka-type languages are those like the French Creole of the Lesser Antilles and French Guiana, Papiamento, Krio and the Virgin Islands Dutch Creole which usually do not make a distinction between the present progressive and the simple present and which usually have an auxiliary-like element associated with all present tense verbs. In the French-based Creoles of the Lesser Antilles this particle is ka, hence Goodman's and our designation. By non-Ka Creoles, we mean languages such as Haitian and Trinidadian which have a distinction between present progressive and habitual present and do not normally have an auxiliary particle in the habitual present.

[3] Cited from Welmers (1973:257).

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.240 (1975)

The Syntax of the 'Infinitive' in Swahili

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0. Abstract

The term 'infinitive' when applied to lexemes with prefix ku- is ambiguous. Morphologically the words of this class display features similar to those of nouns (e.g. alliterative concord), verbs (e.g. objectival concord, formative verbal suffixes). Additionally, by their nature the lexemes of this class bring about specific negative constructions found in no paradigm of the verb.

The ambiguous morphology of the 'infinitive' also displays itself in syntagmatics. The 'infinitive' is syntactically similar to the noun. Therefore it can be modified by an adjective and a pronoun; be combined with a noun in Status Constructus; govern a verb; join a preposition (postpositionally). In a sentence the 'infinitive' acts as a subject, a predicate (qualificative), an object, an attribute. An 'infinitive' with an objectival concordial element acts as a verb: it can govern both a direct and an indirect object, e.g. kumwambia baba ukweli 'to tell Father the truth' (cf. such verbal nouns as mtega ndege 'a catcher of birds', 'a fowler').

In a syntagm or in a sentence the 'infinitive' also displays some specific features. When there are two grammatically homogenous predicates in one sentence, the latter predicate can be replaced by an 'infinitive' with the tense and the mood of the remaining predicate being the same for both, e.g. aliingia chumbani na kusema... 'he entered the room and said...'.

The combination of an 'infinitive' and a noun holds no grammatical subject but it corresponds to a communicative utterance. Such a combination can replace a subordinate clause of cause, purpose, time and condition, e.g. kumwona yule mgonjwa wake mzima akastaajabu sana 'when he saw his patient in good health, he was greatly surprised'. Homonymity in such cases can be easily removed by kwa, ili and some other prepositions.

The combination of a preposition (an auxiliary word) plus a noun and an 'infinitive' produces the contextual effect of a tense which depends on the tense of the predicate, e.g. toka mkoloni wa kwanza kuingia Tanzania historia yetu imekuwa... 'When the first colonizers came to Tanzania, our history has become...' (cf. the combination of a noun and a preposition, and the combination of an 'infinitive' and a preposition, e.g. baada ya miaka mingi 'after many years'; toka kuzaliwa 'since birth')

Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.241-259 (1975)

A Constraint on Deletion in Swahili*

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1. Introduction

Much recent discussion within generative linguistics has centered around whether Chomsky's (1971, 1972) Standard Theory of Lakoff's (1971) Basic Theory (also Postal (1972b)) is best. A large part of the controversy has involved [illegible] assertion by Lakoff that languages contain Global Derivational Constraints. Global Derivational Constraints are rules which apply to two or more distinct structures in a derivation. Such rules are specifically denied by Chomsky (1972) on the grounds that they are overly powerful and unconstrained as theoretical notions and unnecessary in the description of linguistic facts. Indeed, in some cases, Global Derivational Constraints can be stated alternatively as more restricted Semantic Interpretive Rules, which apply to deep structure and surface structure only. Thus, the set of interesting cases for purposes of deciding between the two positions can be defined as those cases where more than two distinct structures or a structure different from the deep or surface structure must be referred to in order to adequately describe linguistic facts. The purpose of this paper is to show how some well known facts of Swahili, when properly described, point to the necessity of Global Derivational Constraints based on all of the above conditions. The particular constraint to be discussed cannot be handled within the Standard Theory without the ad hoc reordering of a syntactic rule to a point following several phonological rules.

2. Constraint

The constraint under discussion helps to guarantee that surface words in Swahili have at least two syllables. It operates by blocking the application of deletion rules when they would apply to segments of a two syllable word. It may be stated as:

(1) DISYLLABIC WORD CONSTRAINT: No deletion rule may apply to any segment of a two syllable word, where word is defined as #...#^{1}.

This constraint blocks at least three different deletion rules in Swahili: two phonological rules and one syntactic rule.

3. Data

I will begin by describing the data (familiar to students of Swahili) and then I will show how a proper account of the data demonstrates the need for Global Derivational Constraints by demonstrating the inability of the Standard Theory to handle the facts with non-global rules.

The first deletion rule I will discuss affects adjective agreement to nouns of classes 9 and 10. For classes 9 and 10, the lexical form of the adjective agreement affix is a nasal consonant without other feature marking. This nasal consonant is marked to agree with a following consonant in terms of the features [high], [back], [anterior], and [coronal] by a rule of ASSIMILATION. If a vowel follows, the features are marked for the palatal nasal /ɲ/ which does not agree in these four features with any other consonants of Swahili. This yields surface forms like:

(2) a. njia m-baya
(9)road AG9-bad (AG = AGreement Affix)
bad road
b. njia n-zuri
(9)road AG9-good
good road
c. njia ny-embamba
(9)road AG9-narrow
narrow road

The agreement affix is deleted preceding a voiceless consonant by a rule which may be written most simply by taking advantage of the fact that only this affix contains unmarked features:

(3) 9/10 ADJECTIVE AFFIX DELETION[2]

$$\begin{bmatrix} \text{u high} \\ \text{+ affix} \end{bmatrix} \rightarrow \emptyset \,/\, \underline{\quad} \text{ [-voice]}$$

This rule (ordered preceding ASSIMILATION) yields:

(4) a. njia pana
(9)road broad
broad road
b. njia fupi
(9)road short
short road
c. njia *m-pana
(9)road AG9-broad
broad road

However, in the case of the monosyllabic adjective stem -pya 'new', where the voiceless consonant /p/ should trigger the deletion rule (as in 4a), the rule of deletion is blocked, yielding (after ASSIMILATION applies):

(5) njia m-pya (cf. 4a and 4c)
(9)road AG9-new
new road.

The reason traditionally given for this is that the accent could not be placed on the adjective without the syllabic nasal /m̩/ since stress is normally placed on the penultimate syllable of a word. Later we will see that this is not a possible reason and that two syllable words are immune to deletion rules regardless of stress.

For class 5, in the same way, there is a rule which deletes the adjective agreement affix before a consonant.[3] This deletion rule may be written as

(6) CLASS 5 ADJECTIVE AFFIX DELETION

$$\begin{bmatrix} \text{+Affix} \\ \text{+Class 5} \end{bmatrix} \rightarrow \emptyset \; / \; \_\_ \; [\text{+consonantal}]$$

and will normally yield results like

(7) a. jani pana
(5)leaf broad
broad leaf
b. jani *ji-pana
(5)leaf AG5-broad
broad leaf

in which no overt marker is permitted. However, in the case of the monosyllabic adjective stem -pya 'new', this deletion rule is blocked, giving

(8) jani ji-pya (cf. 7a and 7b)
(5)leaf AG5-new
new leaf.

Again it might appear that the affix /ji/ is required to bear the accent. In the next set of data, we will find evidence that the proper generalization is different.

This third example of a deletion rule blocked by the DISYLLABIC WORD CONSTRAINT involves infinitive complements to a small class of verbs used as auxiliaries. These auxiliary verbs, which I will call 'modals' purely for convenience, are formed by the combination of a particular tense and verb root, such as -mekwisha 'have already V-ed' (literally: perfect tense + finish), -takuja 'will, will come to V-ing' (literally: future tense + come), and -aenda 'is going to be V-ed' (literally: indefinite present tense + go). Following these verbs, an optional rule applies which deletes the Class Affix of the infinitive noun (class 15) complement. The rule may be written as

(9) CLASS 15 AFFIX DELETION

$$\begin{array}{ccc} [+\text{'Modal'}] & \begin{bmatrix} +\text{Affix} \\ +\text{Class 15} \end{bmatrix} & \\ 1 & 2 & \Rightarrow 1, \emptyset \end{array}$$

Condition: Optional.

This optional syntactic rule of deletion operates to yield:

(10) ni-me-kw-ish-a imb-a
I-perfect-CA15-finish-MV sing-MV (MV = Modal Vowel)
I have already sung

which may be compared with

(11) ni-me-kw-ish-a ku-imb-a
CA15-sing-MV
I have already sung

where the rule is not applied. Such pairs as (10) and (11) do not exist if the verb stem is monoconsonantal. Rather, the deletion rule is always blocked as in

(12) a. ni-me-kw-ish-a ku-l-a (cf. 11)
I-perfect-CA15-finish-MV CA15-eat-MV
I have already eaten
b. ni-me-kw-ish-a *l-a (cf. 10)
eat-MV
I have already eaten.

In all the cases discussed so far, a deletion rule has been blocked from applying to the stressed syllable of the word (i.e. ḿ-pya, jí-pya, kú-l-a where stress = '´'). However, stress can by no means be used to define the operation of the rule-blocking constraint. In fact, neither cyclical stress nor surface stress can account for all the cases where deletion rules are blocked. One set of cases which would resist an explanation based on the idea that syllables necessary to stress placement are not deleted is created by the application of a late rule of CONTRACTION. CONTRACTION attaches the locative verbs -ko, -mo, or -po to the verb w 'be' as in

(13) a. ni-me-kw-ish-a ku-w-á-ko Paris (stress = '´')
I-perfect-CA15-finish-MV CA15-be-MV-BE/LOCATED
Paris
I have already been in Paris
b. ni-me-kw-ish-a *w-á-ko Paris
be-MV-BE/LOCATED
I have already been in Paris.

Here the Class 15 Affix is not stressed at the surface level. Even if we allow a cyclic rule of stress assignment, there would be no stress on the Class 15 Affix at the point where information about the preceding verb becomes available as can be shown.

(14) Underlying: $_{VP}$[ni-me-kw-ish-a $_{N}$[$_{N}$[ku-w-a]$_{N}$ko]$_{N}$]$_{VP}$

Cycle 1: Stress kú-w-a
Cycle 2: Stress ku-w-á- ko
Cycle 3: Deletion ni-me-kw-ish-a *w-á- ko

Here, a formulation which says that stressed syllables are immune to deletion would give wrong results (cf. 13b), even allowing stress rules to be part of the syntactic component as in Bresnan (1971, 1972).

In addition, there are even clearer cases where stress could never be assigned to the Class 15 Affix, as for instance

(15) a. ni-me-kw-ish-a kw-énd-a (derived from ku-énd-a)
I-perfect-CA15-finish-MV CA15-go-MV (CA15-go-MV)
I have already gone
b. ni-me-kw-ish-a *end-a
go-MV
I have already gone.

Stress could never be assigned to the /ku/ that underlies /kw/. Thus, in no way can the constraint which blocks these three[4] deletion rules be formulated in terms of stress. The only way of characterizing the environment where deletion is blocked is in terms of two syllable words, which define all the examples:

(16) #m pya#
#ji pya#
#ku la#
#ku wa#ko#
#kwen da#

The constraint merely guarantees the integrity of two syllable words, it does not specifically provide for two syllable surface words, since two syllable surface words would have remained in examples (13) and (15) even if deletion had applied. Thus the constraint is formulated as

(1) DISYLLABIC WORD CONSTRAINT: No deletion rule may apply to any segment of a two syllable word, where word is defined as #...#.

4. Rule Order

Now let us examine the question of where this constraint can be placed in the grammar. It is clear--at least for example (13) and others like it--that the constraint must be stated before the systematic phonetic level since the constraint must have access to internal word boundaries.[5] The constraint must follow all the rules which add syllables to the infinitive noun. This means all the rules which add derivational suffixes and the object agreement rules must apply first since derivational suffixes and object agreement affixes are separated from the verb root only by formative boundaries. One of the derivational suffixes, the -an- reciprocal suffix, is derived by a late rule which operates on conjoined sentences. With this and other syntactic facts,[6] it is possible to establish that the constraint must be stated at least with the post-cyclic syntactic rules. However, the constraint must be placed even later because it must follow some phonological rules.

The principal of these phonological rules will be the one which converts the vowel of the Class 15 Affix ku into the corresponding glide as in example 15 (kw-end-a derived from ku-end-a). Those Class 15 Affixes which are not converted into consonant-glide sequences may delete as in example 10 (imb-a from ku-imb-a). This rule will be called GLIDE RULE. However, this particular application of GLIDE RULE is unusual because phonological rules in Swahili do not ordinarily apply preceding Noun or Verb Stems.[7] Such exceptional stems must be lexically marked, but this marking, while a necessary condition, is not sufficient. In addition, the word containing the marked stem must not have more than two syllables following the Class 15 Affix in order to undergo the GLIDE RULE. Thus the exceptional stems will be marked to undergo GLIDE RULE after the application of all syllable adding rules (as in the last paragraph) by a rule, EXCEPTION RULE, which appears to be a readjustment rule as defined in Chomsky and Halle (1968) since it alters the syntactic description of a form to ready it for the proper application of phonological rules. The alteration involves changing the value of the feature [Obligatory Affixation] which separates Noun and Verb Stems from all other stems.

(17) EXCEPTION RULE

$$\#\overset{\text{CV}}{\begin{bmatrix}\text{+Affix}\\ \text{+Noun}\end{bmatrix}} + \underset{[\text{-Obligatory Affixation}]}{\overset{\text{VC}_1\text{V}}{\begin{bmatrix}\text{+Obligatory Affixation}\\ \text{+Lexical Feature ' '}\end{bmatrix}}}\#$$

The EXCEPTION RULE feeds the GLIDE RULE.

(18) GLIDE RULE

$$\begin{bmatrix}\text{+vocalic}\\ \text{+affix}\end{bmatrix} \rightarrow [\text{-vocalic}] \; / \; \left(\begin{bmatrix}\text{+consonantal}\\ \text{-coronal}\end{bmatrix}\right)\_\_\begin{bmatrix}\text{+vocalic}\\ \text{-Obligatory}\\ \text{Affixation}\end{bmatrix}$$

The application of these two rules gives such forms as

(19) #kw+end+a# (from #ku+ end +a#) 'to go'
[+'X']
#kw+ish+a# (from #ku+ ish +a#) 'to finish'
[+'X']
#kw+ib+a# (from #ku+ ib +a#) 'to steal'
[+'X']
#kw+it+a# (from #ku+ it +a#) 'to call'
[+'X']

and the following cases where the EXCEPTION RULE cannot apply because its phonological description is not met (although the Lexical Feature 'X' is still part of the root) and so the GLIDE RULE does not apply either:

(20) ku+i+ib+a (i is introduced by object agreement)
ku+it+w+a (w is the passive affix)
ku+end+e+a (e is the prepositional affix)
ku+wa+ish+a (wa is introduced by object agreement).

The forms of (19), but not of (20), meet the structural description of DISYLLABIC WORD CONSTRAINT and so are immune to deletion as in example (15). In this way, GLIDE RULE provides the definition of the point at which DISYLLABIC WORD CONSTRAINT can be stated.[10]

From this we can see that DISYLLABIC WORD CONSTRAINT must be stated following EXCEPTION RULE and GLIDE RULE and preceding the Systematic Phonetic level in order to correctly define the cases in which deletion rules are blocked. We can also place the three deletion rules in the grammar. CLASS 15 AFFIX DELETION is a purely syntactic rule which only refers to syntactic information. CLASS 9/10 ADJECTIVE AFFIX DELETION is a purely phonological rule ordered following the phonological rule of ASPIRATION which adds aspiration to voiceless consonants in the presence of a class 9 or class 10 affix and preceding the rule of ASSIMILATION. CLASS 5 ADJECTIVE AFFIX DELETION is a phonological rule with syntactic conditions which cannot be ordered relative to the other rules. Thus the three rules and the constraint may be located at as many as four different points in the grammar. The constraint and the two phonological deletion rules *could* be sequential since there is no evidence against this possibility, but there is no evidence for this either. In any case the three deletion rules must be related to the constraint by some means.

5. Possible Solutions

In order to appreciate the implications of these facts, let us see how they can be treated within the Standard Theory. In this theory, all syntactic rules apply, followed by readjustment rules, and then the cyclical phonological rules followed by the word level rules. The constraint and the phonological deletion rules would be word level rules. Exceptions (such as the one defined by DISYLLABIC WORD CONSTRAINT) may be handled within the Standard Theory by a number of devices. One of these is lexical marking of exceptions. Others are the 'minus next rule' convention and readjustment rules which mark exceptions. These rules take as their environment the intrinsic content of the formative affected.

5.1. Lexical Marking. Lexical marking of the exceptions will be rejected out of hand. This is not because the data can not be handled this way. On the contrary, if -pya is marked as [-CLASS 9/10 ADJECTIVE RULE DELETION, -CLASS 5 ADJECTIVE AFFIX DELETION] and the approximately fifteen verb roots which are exceptions to CLASS 15 AFFIX DELETION are so marked, then the data can be handled, provided that CLASS 15 AFFIX DELETION is rewritten so that its structural description includes the structural description of EXCEPTION RULE in some way, since this remains part of the description of exceptional stems. EXCEPTION RULE will still be independently required to define possible inputs to GLIDE RULE. Thus with some duplication, lexical marking handles the data. However, by using lexical marking, we not only cover up the generalization expressed by DISYLLABIC WORD CONSTRAINT, but we claim that there is no principled relation between the various exceptions. This claim is clearly false and it is no coincidence that all are disyllabic words.

5.2. Expansion of the Standard Theory. As set forth in Chomsky and Halle (1968), the other two devices for handling exceptions cannot be used to express the generalization of the constraint either because the exceptions are based on an environment outside the particular formative (the affixes in this case) which is to be marked as an exception. An extension of these rules to take environment into account, called 'negative context' rules, was mentioned and rejected in Chomsky and Halle (1968) on the grounds that no such rule had been necessary in the sample of languages they had studied. The context in this case will be the number of syllables including the affix. Since the affix must be included in the count of syllables, the rule would have to be written like a transformational rule instead of like an ordinary phonological rule. Writing the rule this way, we may place it before any rule it affects and it will mark two syllable words as exceptions by the convention [-Next Rule]. This means that the constraint would have to be stated at least three times--once for each rule of deletion. The number of times the constraint must be stated cannot be reduced even if we take up another rejected modification in such rules and allow it to name the rules it marks exceptions for, unless we allow the rule to mark every item as exempt for all three rules of deletion by name. This is somewhat vacuous since it is obvious that the adjective agreement affixes do not need to be exempt specifically from CLASS 15 AFFIX DELETION and vice versa. Here we might simplify by allowing the constraint to refer to the form of the rules it blocks, in this case the common structural change that defines deletion rules:...→ Ø... which can be included in a minus feature as [-Rule containing ...→ Ø...]. Now we can state one constraint for all the rules if we can order them after the constraint.

The constraint follows some phonological rules, but there is no reason that the phonological deletion rules should not be ordered following it. The only reason for so ordering them is to permit the use of exception marking devices available to the Standard Theory. Even so, we cannot account for the syntactic rule of deletion since it will precede any phonological rule or phonological constraint. For the same reason, it will not help to state the constraint as a readjustment rule either. If we try to state the exception marking rule before the syntactic deletion rule, the phonological environment does not exist. If we allow the constraint to know what rules will apply later in the derivation, then it becomes global.[11] Since, by definition, the Standard Theory excludes global rules and is thereby distinguished from the Basic Theory of Lakoff (and others), it is necessary to find some other solution.

A possible solution which conserves this feature of the Standard Theory (non-globality of rules) is to allow the syntactic rule of deletion to be placed in the phonological component.[12] By allowing a purely syntactic rule to be placed following a number of purely phonological rules and accepting all the other expansions of the Standard Theory which have been suggested in the preceding paragraphs, it becomes possible to account for the facts without global derivational constraints. However, it should be obvious that this solution is ad hoc and very expensive. The Standard Theory--without global rules--very nearly does not permit the statement of the simple generalization contained in the DISYLLABIC WORD CONSTRAINT (1). But before giving up entirely the notion that global rules are not part of language, let us examine other devices for describing facts which are more powerful than those we have so far tried to use and which are compatible with the Standard Theory.

5.3. Kisseberth's Constraints. First, let us see if the data can be handled using the derivational constraints suggested by Kisseberth (1970). The type of derivational constraint he proposes can block the application of a rule if its output is deviant in some way. The constraint can also refer to the input for purposes of comparison in determining the acceptability of the output. Using this powerful descriptive device, it is possible to handle most of the cases with the following

> (21) NON-GLOBAL DERIVATIONAL CONSTRAINT: No rule may have in its output a monosyllabic word which was not in its input, where word is defined by #...#.

The constraint (21) still does not handle the cases where the output will be disyllabic but still unacceptable (the cases defined by the application of the GLIDE RULE). In order to account for these, we can alter the constraint to recognize exceptional disyllabic stems. This requires curly brackets (an either/or condition) and the introduction of defining features giving:

(22) NON-GLOBAL DERIVATIONAL CONSTRAINT: No rule may have in its output either (1) a monosyllabic word which was not monosyllabic in the input or (2) a disyllabic word marked with [+Obligatory Affixation] which was trisyllabic in the input, where word is defined for both (1) and (2) as #...#.

The condition on input and the feature in (2) above allow EXCEPTION RULE and GLIDE RULE to apply without being blocked by the constraint. The generalization that two syllable words are exceptions to deletion rules is completely covered up. The constraint (22) is really two separate constraints which have nothing in common: monosyllabic words are not created and trisyllabic N or V are not reduced. Thus it really claims that it is a coincidence that all the exceptions are disyllabic words. Here, once again, it is seen that a high price must be paid to obtain an ad hoc and descriptively inadequate solution, simply to avoid accepting global derivational constraints as part of language.

5.4. Other Single Level Constraints. Just as no early conditions (such as lexical marking) can give a clear account of the facts, so no late condition such as Shibatani's surface phonetic constraints can do so either. Since the history of a form and nothing intrinsic to its phonetic representation defines its acceptability, surface phonetic constraints cannot even mark all the unacceptable forms. Since surface phonetic constraints cannot block the application of earlier rules, they cannot play a role in the derivation of all the acceptable forms. For any late single level condition to work, it would have to recreate the effect of the deletion rule as an insertion rule[13] which is not motivated.

5.5. Multilevel Constraints: Global Constraints. At this point, it should be apparent that there is no non-global solution which will accurately capture the generalization which describes the facts without the ad hoc reordering of a syntactic rule after some phonological rules. The best solution developed while trying to handle the facts within the Standard Theory was (5.2) the one which allowed exception marking rules to refer to a context, be written like transformational rules, refer to other rules on the basis of their structural properties (e.g., deletion rules), and be placed wherever they could properly describe the facts. The problem with this expansion of the Standard Theory was that it did not have the property of globality. In fact, this solution was very close to being a Global Derivational Constraint as defined in Lakoff (1971) and Postal (1972). Global Derivational Constraints are written like transformational rules and refer to contexts. They may refer to properties available for the formulation of transformational rules. What makes them different is the fact that they may be stated on multiple levels, each such level being defined by a transformational rule. In the case being examined in this paper, the levels may be restricted to those defined by GLIDE RULE, following which it is possible to state the constraint, and by the three deletion rules: CLASS 9/10 ADJECTIVE AFFIX DELETION, CLASS 5 ADJECTIVE AFFIX DELETION, and CLASS 15 AFFIX DELETION. It is just as possible to generalize to all deletion rules. Thus the DISYLLABIC WORD CONSTRAINT may be written as the following Global Derivational Constraint:

(23) DISYLLABIC WORD CONSTRAINT[14]: If, following GLIDE RULE, A is a two syllable word (word being defined by #...#), then no constituent corresponding to A has ever or will ever be a possible input to a deletion rule (defined as a rule containing ...→ Ø...).

What is crucial for distinguishing cases like kw-end-a from cases like ku-imb-a (cf. examples (10), (11), and (15)) is for the rule of deletion to have access to the future operation of GLIDE RULE ('future' in the sense of the cyclical orientation of the rules). This particular Global Derivational Constraint is unusual not only in its need for forward globality (see also Wilkinson (1974)) but in that it may refer to as many as four levels, none of which is the semantic level. This means that the constraint on the form of Global Rules suggested by Postal (1972) that, if more than two levels were referred to, one would be the semantic representation cannot hold. All the other conditions do hold however.

6. Conclusion

In conclusion, I have tried to show that, although transformational generative grammar is too powerful and needs to be restricted, it is not possible to exclude Global Derivational Constraints without losing the power to adequately describe facts of natural languages. Restrictions on transformational theory can only come about through intensive study of a wide variety of languages leading to an understanding of the natural limitations of the power of grammars. I have also tried to show that one consequence of excluding global derivational constraints is that the notions phonological component and syntactic component lose content, since rule order can not then be formulated in terms of this division of rules. Even if this division of rules into two components is abandoned, rules like Global Derivational Constraints are still required (as was pointed out above) even if in this case globality is not needed. Only further work with global derivational constraints and with the interaction of syntax and phonology will give a final answer to the questions raised in this paper, although it seems that Global Derivational Constraints will be needed to describe human languages.

Footnotes

*The development of this work was funded by the Centro Unificado Profissional. It is based on data supplied by the late Ali A. Farsi, his wife Hujeijah, and her brother Nassir Farsi, all Zanzibaris.

[1] Word formation will be based on a convention like that of Chomsky and Halle (1968). The nodes labeled S, N, V, Adj(ective), ADV(erb), and Prep(osition) will receive # on each side (e.g. #S#, #N#, etc.). Word will be defined by single word boundaries #...# in this paper, but only sequences of two word boundaries may be realized phonetically as a pause and thus define 'surface word'.

[2] This rule allows us to avoid the use of curly brackets by taking advantage of the fact that at least four features of this affix are unmarked when it is introduced. The feature chosen is arbitrary (for the group of four unmarked features). The cost of writing the rule this way is that ASSIMILATION, which marks the features, must be ordered following CLASS 9/10 ADJECTIVE AFFIX DELETION.

The alternative, with no order between ASSIMILATION and the deletion rule would be:

(i) DELETION

$$\begin{bmatrix} +\text{Affix} \\ \left\{\begin{matrix} +\text{Class } 9 \\ +\text{Class } 10 \end{matrix}\right\} \end{bmatrix} \rightarrow \emptyset \ / \ \_\_ \ [-\text{voice}]$$

The plural of class 14 will simply be identified with class 10.

It should be noted that this rule no longer applies synchronically to nouns. The class 9/10 noun affix is 0 and not N today.

[3] The affix is given as /ji/ because of this case, the monosyllabic noun stems (where the class affix is /ji/ too), and the fact that /ji/ would be reduced to /j/ before vowels by the general rule of VOWEL LOSS. VOWEL LOSS reduces CV affixes to C preceding the vowel of a form which is marked [-Obligatory Affixation]. (This feature is explained in footnote 7.)

(i) VOWEL LOSS

$$\begin{bmatrix} \text{V} \\ \alpha\text{high} \\ +\text{affix} \end{bmatrix} \rightarrow \emptyset \ / \ \begin{bmatrix} \text{C} \\ \alpha\text{coronal} \end{bmatrix} \_\_ \begin{bmatrix} \text{V} \\ -\text{Obligatory} \\ \text{Affixation} \end{bmatrix}$$

This rule accounts for the following alternations:

(ii) zi/z, li/l, ni/n, ji/j, wa/w, ma/m, ya/y, pa/p

[4] There is a possible fourth rule. It is identical in every way to CLASS 15 AFFIX DELETION except that it is obligatory and not optional. This rule is triggered by Tenses and accounts--

along with DISYLLABIC WORD CONSTRAINT--for such alternations (Class Affix 15 or nothing) as:

(i) a. ni-na-kw-end-a
I-present-CA15-go-MV
I am going
b. *ni-na-end-a
c. ni-na-ku-l-a
I-present-CA15-eat-MV
I am eating.
d. *ni-na-l-a.
e. ni-na-imb-a
I-present-sing-MV
I am singing
f. *ni-na-ku-imb-a
I-present-CA15-sing-MV

For further discussion of these cases and how they fit into the treatment given above, see my dissertation (Brandon 1974).

Although I will not argue for the following points here, I would change the treatment of Brandon (1974) in order to accomodate the more general constraint on deletion (1) in these ways:

Since, for some speakers, deletion of the Class 15 Affix is always optional following any 'Modal' Auxiliary and since the deletion rule following tenses is identical in every way except optionality, I would treat the optionality as a function of relexicalization. Thus a 'Modal' Auxiliary like *nimekwisha* 'I have already V-ed' would have two possible underlying forms: one derived from the verb *ish* 'finish' by joining it to the tense *me* 'perfect' and the other in which the string *mekwisha* has been lexicalized and marked with some of the features of a tense. In the former case, the deletion rule would not be triggered. In the latter case, the rule would be triggered by the same features which all tenses possess. This way the rule is always obligatory and we capture the fact that 'Modal' Auxiliaries are usually early stages in the relexicalization process that leads to new tenses in Swahili (such as the *-mesha-* tense recently derived from *-mekwisha-* and having the same meaning).

It should be noticed that there are tenses which do not show any evidence of the function of the DISYLLABIC WORD CONSTRAINT. They trigger deletion, but deletion is *not* contrained in any way. For this group of tenses, I will propose that there exists a (readjustment?) rule which erases the internal word boundary between the Tense and the infinitive noun, thus destroying the boundary which is necessary to continue defining the infinitive noun as a word. When this happens then the infinitive noun is simply part of the finite verb which is the first word available to the constraint: e.g.

(ii) #ni+na#*ku*+l+a# - the *ku* cannot delete because of Constraint
#ni+ki+*ku*+l+a# becomes #ni+ki+l+a# because the Constraint finds no two syllable word

For explanations of this analysis and reasons for eliminating other alternative analyses of finite verbs, see especially chapters 4 and 5 of my dissertation.

[5] Shibatani (1973) claims in his footnote 16 that internal word boundaries would be available at the systematic phonetic level although he gives no arguments for this claim. If this were so, the DISYLLABIC WORD CONSTRAINT could be stated at the systematic phonetic level--and perhaps should be, since (except for its awareness of internal word boundaries) it appears to be a phonetic constraint. This would not change the form of the arguments presented in the paper, since it would be even worse to reorder a syntactic rule *after* a phonetic constraint.

[6] See sections 4.1 to 4.3 of Brandon (1974).

[7] Most of the phonological rules of Swahili have a general morphological condition on them. The condition could be stated very generally as

> (i) Phonological rules change affixes in the environment of stems (usually [-Obligatory Affixation]).

All of the rules discussed in this paper obey this generalization. Some purely phonological (without morphological conditions) rules exist, such as the rule which converts *ky* to *č* and the rule that inserts *l* between vowels in derivational suffixes of verbs. Rules which obey the general morphological condition generally only accept stems which are marked as [-Obligatory Affixation]. The feature [Obligatory Affixation] separates Noun and Verb Stems on one side from Adjective, Tense, Demonstrative, Relative, and Quantifier Stems on the other. The feature--although it defines two large morphological classes for the purposes of phonological rules--is not arbitrary. It is a lexical feature which determines the operation of the syntactic lexical rule of Obligatory Affixation which adds a Class Affix to noun and verb stems. See section 5.5 of Brandon (1974) also.

[8] Since only verb stems show the kind of alternations based on number of syllables described by this rule, the rule is too general since it refers to stems in general. This economy is allowed by the fact that the Lexical Feature 'X' can only be of use with Verb Stems. There are Noun Stems which are also exceptions, but not all of them are only two syllables in length which means that some other Exception Marking Readjustment Rule must handle them, using a different Lexical Feature since nouns so marked would be unconditionally readjusted so as to undergo phonological rules.

It would also be possible to write a Special Glide Rule exclusively for Class 15 Affixes by combining the GLIDE RULE and the EXCEPTION RULE, but since the GLIDE RULE already accounts for other *ku/kw* alternations, duplicating part of it as another rule would merely complicate the grammar and disguise the fact that a genuine exception is being described.

[9] The GLIDE RULE follows IDENTICAL VOWEL COLLAPSING which deletes a vowel identical to an adjacent vowel when one vowel is

part of an affix and the other is part of a stem marked [-Obligatory Affixation]. This order allows GLIDE RULE to be written without restrictions on the vowels involved, besides being a 'natural' order. GLIDE RULE accounts for the following alternations in Affixes:

(i) i/y, vi/vy, mi/my, ki/č (from *ky* by another rule), ku/kw, mu/mw, u/w

The loss of the glide /w/ in some circumstances is described in footnote 10 below.

[10] There is an exceptional variation *k-og-a* from *ku-og-a* 'to bathe' which should have become **kw-og-a* because of the GLIDE RULE. Obviously, *k-og-a* meets the description of the DISYLLABIC WORD CONSTRAINT, but so does **kw-og-a*. Thus we can state the constraint after GLIDE RULE (minimal conditions are first met at this point) and allow the rule of GLIDE LOSS to follow the constraint without any problems. The rule of GLIDE LOSS is necessary for the proper surface forms. This rule is not written as a rule of U LOSS preceding the GLIDE RULE since /u/ is permitted on the surface where /w/ is forbidden by surface phonetic constraints which are apparently the motivation for this rule of GLIDE LOSS. The /w/ of an affix is lost in every context preceding the rounded vowel of a stem (marked [-Obligatory Affixation]) unless it is preceded by two word boundaries. Taking advantage of the conventions of Chomsky and Halle (1968) on segment marking, the rule can be written very simply as

(i) GLIDE LOSS

$$\begin{bmatrix}\text{w}\\ \text{+Affix}\end{bmatrix} \rightarrow \emptyset \;/\; [\text{+segment}]\,[\text{-segment}]_{0}^{1} \;\text{—}\; \begin{bmatrix}\text{V}\\ \text{+round}\\ \text{-Obligatory}\\ \text{Affixation}\end{bmatrix}$$

The results of this rule are

(ii)	yo yote	(*ywo ywote)
	mɔ mote	(*mwo mwote)
	ko kote	(*kwo kwote)
	koga	(*kwoga)
	wo wote	(does not apply because *##*wo*##*wote##)
	ana*o*kata	(not ana*wo*kata)
	atak*a*o	(not ataka*w*o because a+tak+*a#*wo)

[11] It should be pointed out that circularity is not the same as globality. By circularity, I mean the type of grammar we have if we follow the arrows in figure 1 of Halle (1973) which unfortunately are not explained in the text. By these arrows, it would seem that a derivation, having passed through the phonological component may pass through the word formation component and back into the syntactic component. Since Halle does not explain his claim that he has been able to eliminate derivational constraints by the use of word formation rules preceding the syntax, we can

guess that he must mean that derivational constraints can be eliminated either by placing phonological rules (i.e. word formation rules) before the syntactic rules or by filtering information from the phonological component through the word formation rules (i.e. phonological rules which precede syntax). This is a variation of the possible solution which reorders the syntactic deletion rule following the phonological rules which can bleed it, in which a new component is set up to include all the phonological rules which might affect syntactic rules. This is no more arbitrary than the solution just invented in the text of this paper, except that the arbitrariness is concealed somewhat by the concept that there are two sets of phonological rules: one preceding and one following the syntax. Further studies by Halle and others will no doubt show what the empirical content of this theory is, but at this point it would seem simpler to abandon the notion of a syntactic and a phonological component and allow all the rules to mix freely, being ordered by a general principle or principles like those discussed in Koutsoudas, Sanders, and Noll (1974). If, on the other hand, Halle intends us to understand that information is sent back from the phonological component to the syntactic component, then the solution will be a variation on derivational constraints like Kisseberth's. A pair of features designating a possible mistake by the syntactic deletion rule would be sent back to the syntactic component where the syntactic rule would undo its mistake if it is sensitive to that pair of features. The unfortunate effect of this possible circular solution is that it covers up the generalization that two syllable words are immune to deletion.

[12] There are rules of phonology which have been accepted as part of the cycle of syntax (Bresnan (1971, 1973)), but the rules discussed here are not cyclic and are typical syntactic and word level phonological rules. The only argument for reordering in the case presented here is to avoid globality in grammar.

Dinnsen (1974), in his attempt to restrict derivational constaints of the type developed by Kisseberth, notices the very interesting fact that global rules in phonology usually involve deletion. He uses this fact to restrict global rules by allowing deletion rules to mark the forms they affect with a feature which is cost-free: the null segment, Ø (which is later deleted by a universal rule, which naturally adds no cost to individual grammars). This allows derivational history to be encoded for deletion rules. It should be clear that this solution is the same as the one discussed in the text concerning derivational constraints like Kisseberth's. This solution requires reordering of rules in order to function. It may be that Dinnsen is advocating the reordering of syntactic rules following phonological rules based on some universal sequencing principles and an absence of extrinsic order. Only in this way can we make sense of the fact that Cook (1971) is cited in the references of Dinnsen's paper. Cook's data are like mine in that phonological rules determine whether syntactic rules can apply. The only way that the Null Segment Hypothesis can handle these data is if Cook's four syntactic deletion rules are ordered to follow his two phonological rules. It could be that Dinnsen hopes to control the phonological rules through the syntactic rules, but this is not possible as I read Cook's data. Unfortunately, Dinnsen does not try to reformulate Cook's solution in terms of his Null Segment Hypothesis.

What is of more interest for this paper is not the fact that the Null Segment Hypothesis cannot handle the data at all, but the possibilities for principled rule reordering that are also suggested by Dinnsen. First, it should be noted that if the GLIDE RULE gets a ∅ from CLASS 15 AFFIX DELETION, there is no way it can be cued to reinsert a /k/ or a /kw/ (see note 13). If we reorder, the deletion rule can be written to be sensitive to the operation of the GLIDE RULE, but *not* by a null segment. Second, what reason could be given for reordering the syntactic rule after the phonological rules? Dinnsen reports a personal communication from G. Sanders and G. Iverson in which they propose a RADICAL CHANGE PRECEDENCE which is a principle saying that deletion and insertion rules should precede feature changing rules. This principle would place CLASS 15 AFFIX DELETION before GLIDE RULE and the DISYLLABIC WORD CONSTRAINT, just as is proposed in this paper--thus requiring Global Rules. When we turn to the other principles proposed by Koutsoudas, Sanders and Noll we find that the situation is the same. The principle of PROPER INCLUSION PRECEDENCE places a rule applying to a larger context prior to a rule which applies to a properly included subcontext. Thus, CLASS 15 AFFIX DELETION would precede EXCEPTION RULE and GLIDE RULE and the Constraint would again have to be global. The Constraint and the syntactic deletion rule are in a bleeding and counter-bleeding relationship. This relationship is defined by the PROPER INCLUSION PRECEDENCE as noted above, leaving the syntactic rule preceding and requiring a global statement of the generalization. The non-extrinsic ordering principles force us to admit globality in language or to simply cover up the DISYLLABIC WORD CONSTRAINT and claim that no generalization exists and that it is a mere coincidence all forms which are immune to deletion are also disyllabic after the application of GLIDE RULE. As a matter of fact, we can observe that these principles would place EXCEPTION RULE before CLASS 15 AFFIX DELETION. Unfortunately the way the rules are written this order, in itself, would leave us with forms marked to undergo the GLIDE RULE but lacking the affix *ku* which GLIDE RULE would affect. However we can reformulate the rules. EXCEPTION RULE will not only prepare stems to undergo GLIDE RULE but will in addition mark all such forms as [-next rule]. Monoconsonantal verb stems and monosyllabic adjective stems will be marked in the lexicon as being exempt from deletion. The data is handled. The generalization is lost. At this point, it must be clear that the best alternative to Global Derivational Constraints is the expansion of the Standard Theory first offered with the *extrinsic* reordering of syntactic rules following phonological rules. Such a solution *at least* can state the generalization which is simply unstateable in the non-extrinsic theory just discussed without global rules.

[13] For a demonstration of the impossibility of rewriting the deletion rule as an insertion rule, see section 4.4 of Brandon (1974).

[14] The general statement of DISYLLABIC WORD CONSTRAINT would also block the deletion of suffixes. There is no problem in this since the rules which apply to suffixes can be written as rules of insertion. These rules insert vowels between consonants and /l/s between vowels. The vowels could be inserted or deleted with equal facility, but it is easier to write an /l/ insertion rule than a deletion rule. The general statement of the constraint could also be taken as a motivation for the relexicalization of monosyllabic noun plus suffix as in the case of pwani 'coast' and chini 'ground, bottom' both historically derived from a word of approximately the same meaning by the addition of the -ni locative suffix. This might also explain or motivate the development of the class of tenseless verbs -na 'be with', -ko 'be located around, at', -po 'be located right at, on', -mo 'be located inside', -hai 'be alive' (in the speech of my principal informant). (See section 5.2 and footnote 5 in Brandon (1974)).

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.260-269 (1975)

Relational Grammar and Some Aspects of Swahili Syntax*

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1. Introduction

The theory of relational grammar developed by Postal and Perlmutter (Class Lectures, LSA Summer Institute, 1974) treats grammatical relations rather than constituents as the primitives of clause structure. The relations are Subject (I), Direct Object (II) and Indirect Object (III). They are called terms. Only terms can trigger certain processes, such as verbal agreement, dative movement, and passivization. New terms can be created only by the operation of a cyclic transformation, and the replaced term loses its grammatical relation and becomes a _chômeur_. The chômeur is a non-term and cannot trigger any of the above mentioned operations. In order for a term to become a chômeur, some NP must assume its former grammatical relation to the verb. For example, the application of the passive transformation is said to convert a II into a I, with the old I becoming a chômeur. An examples of this in English is given in (1):

(1) a. Jane found the book.
 I verb II →
 b. The book was found by Jane.
 I verb chômeur

Postal and Perlmutter make a universal claim that only II's can be passivized and that in order for a III to be passivized, dative movement must apply to change the III into a II. This is shown in (2).

(2) a. Jane told the answer to her.
 I II III →
 b. Jane told her the answer.
 I II chômeur →
 c. She was told the answer by Jane.
 I chômeur chômeur

The purpose of this paper is to examine some problematic syntactic phenomena in Swahili in the light of this theory. It will be shown that while relational grammar can offer a principled explanation for the behavior of certain constructions, it fails in other respects. The dialect of my informant was Bravanese Swahili, although standard grammars were consulted as well.

2. Phrasal Predicates

The first case I will cover is the phrasal predicate which has been discussed by Harries (1970). This is a construction composed of either a verb + noun, verb + two nouns, verb + verb, or noun + verb which acts as a syntactic unit expressing a single predicative function. That is, the components of the phrasal predicate do not bear any grammatical relation to each other. Thus, in a noun + verb phrasal predicate, the noun will always fail to trigger object agreement with the verb, while a verb + genuine direct object may agree. For example, consider (3) and (4).[1]

(3) Tu---li---vunja jungu mwisho wa Ramadhani.
We--tns.--break big cooking pot end of Ramadhan.
'We had a big celebration at the end of Ramadhan.'

(4) Tu---li---li---vunja jungu mwisho wa
We--tns.-o.m.--break big cooking pot end of
'We broke the big cooking pot at the end of
Ramadhani.
Ramadhan.
Ramadhan.'

These two sentences have totally different meanings, even though the lexical items are virtually the same. Tulivunja jungu in (3) is a phrasal predicate, as evidenced by the fact that it does not trigger object agreement with the verb. The verb in (4), however, does contain the object marker li, which shows that jungu here is considered to be a direct object or a II. A further distinction between (3) and (4) is the fact that jungu in (3) is not passivizable, while it is in (4). This is shown in (5) and (6).

(5) *Jungu-li---li-----vunj---wa na sisi mwisho wa
big -s.m.-tns.---break--pas. by us end of
'A big celebration was had by us at the end of
Ramadhani.
Ramadhan.
Ramadhan.'

(6) Jungu li----li---vunj---wa na sisi mwisho wa
'The big cooking pit was broken by us at the end
Ramadhani.
of Ramadhan.'

In transformational grammar, where the structural description of passive takes into account the position of NP's in the sentence, the failure of jungu to passivize in (5) would be unexplained. But this failure to passivize would follow from the principles of relational grammar, since it claims that only II's bearing a grammatical relation to the verb, as shown here by the agreement, can passivize.

(7) nchi i----me---enea maji.
country s.m.-tns.--cover water.
'The country is covered by water.'

(8) Maji ya----me---enea nchi.
Water s.m.--tns.--cover country.
'Water covers the country.'

In sentence (7), the phrasal predicate is *imeenea* *maji*. *Nchi* is the subject of the sentence, as indicated by the subject marker *i* on the verb. There is no object marker for *maji*, since it bears no grammatical relation to the verb. Note that this sentence is not passive in Swahili. In (7), there is also subject agreement, this time between *maji* and the verb, but there is still no object agreement even though *nchi* appears to be the notional direct object. This is because *nchi* is not a II, but a locative, and therefore a non-term. The fact that *nchi* can occur alternatively with the locative suffix *ni*, e.g. *nchini*, or with a preposition in this sentence demonstrates this (Harries 1970).

Another example of a phrasal predicate can be seen in (9) and (10).

(9) a---li---kufa maji.
he-tns.--die water
'He was drowned.'
(10) a---li-----vunjika---------mguu
he--tns.--break himself----leg
'He broke his leg.'

In each of these sentences, a verb that doesn't normally take an object does so as a component of the phrasal predicate. But as in the other cases, the verb and object do not agree, since the so-called objects are actually non-terms rather than II's, as is shown by the fact that neither is passivizable.

Sentence (11) is an ambiguous sentence which could be interpreted as either a phrasal predicate, as in (11a) or a I verb II construction, as in (11b).

(11) Juma---a---li---piga----risasi
Juma-s.m.-tns.-v.d.a.---bullet(s).
a. Juma shot
b. Juma shot (a) bullet(s).

When *alipiga* *risasi* is interpreted as a phrasal predicate, the sentence is a pseudo-intransitive. As a component of the phrasal predicate, *risasi* is a non-term which can neither trigger agreement nor be passivized. In the (b) reading, on the other hand, *risasi* is considered to be a II, and it can both be passivized and trigger agreement when it has a definite reference.

The final example of a phrasal predicate I will mention is a problem for relational grammar. Consider sentences (12) and (13).

(12) a----li----piga--mbio.
he--tns.--v.d.a.-race, fast.
'He ran.'

(13) a----li----zi----piga mbio
he---tns.--o.m.--v.d.a. race, fast.
'He ran very fast.'

Sentence (12) is a typical verb + noun phrasal predicate where *mbio* fails to trigger agreement. In (13), on the other hand, verbal agreement occurs. Harries claims that the noun part of the phrasal predicate can never trigger agreement. Therefore, *mbio* is considered to be a direct object in (13), or in relational terms, a II. However, *mbio* cannot be given a separate meaning without the stems -*piga* or -*enda* nor can it be passivized. This behavior provides a counter example to relational grammar, unless one tries to claim that the agreement here denotes something other than a grammatical relation between the noun and verb. It is interesting to note here that according to Maw (1969), although agreement may provide evidence for grammatical relations, it doesn't in itself set up the categories.

3. The interaction between direct and indirect objects

The next problem I will discuss has to do with the interaction of so-called direct and indirect objects. In this section I will use the terms direct and indirect object as they are used in transformational grammar. I will use the terms II and III when referring to relational grammar.

Sentence (14) is an active sentence with a direct object, *shati*.

(14) Wazee wa---li-----nunua shati.
Parents s.m.--tns.---buy shirt
'The parents bought a shirt.'

In (15), *shati* has been passivized.

(15) Shati----li----li----nunuliwa na wazee.
shirt---s.m.--tns.---buy pas. by parents
'A shirt was bought by the parents.'

Now consider sentences (16) through (18):

(16) Wazee wa----li---m-----nunulia shati mtoto.
parents-s.m.--tns.-o.m.---buy-applied shirt child.
'The parents bought a shirt for the child.'
(17) Mtoto a----li----nunuliwa shati na wazee.
Child s.m.-tns.---buy--p.a. shirt by parents
'The child was bought a shirt by the parents.'
(18) *Shati----i----li---nunuliwa mtoto na wazee.
Shirt--s.m.--tns.--buy-p.a. child by parents.
'A shirt was bought for the child by the parents.'

As you can see by the grammaticality of (17) and the ungrammaticality of (18), when a sentence contains in traditional terms, both a direct and indirect object, only the indirect object can be passivized. Recall that relational grammar claims that only a direct object, or II, can be passivized, and that dative movement first applies to change a III into a II, with the old II becoming an unpassivizable chômeur. However, there are several problems with this analysis for Swahili. The first is that Postal and Perlmutter assume that all so-called indirect objects are preceded by the preposition *kwa* in deep structure, although there is no actual evidence that such is the case since *kwa* and the applied form illustrated in (16) do not freely alternate on the surface.

Nonetheless it might at first seem reasonable to assume that some kind of rule applies to change deep structure III's into II's causing the old II's to become chômeurs. Otherwise one would be claiming that the occurrences of *barua* in (19) and (20) bear totally different grammatical relations to the verb in deep structure.

(19) Mwalimu---a----li-----andika barua.
teacher--s.m.--tns.---write letter.
'The teacher wrote a letter.'
(20) Mwalimu----a----li----w----andikia-------wazee
teacher--s.m.--tns.--o.m.--write-applied-parents
'The teacher wrote the parents a letter.'
barua.
letter

Assuming grammatical relations to be semantically based, this would be a very strange claim.

Let us look at some more examples to determine what the constraints are on which NP's may be passivized and also of what exact significance is the notion "indirect object" for Swahili. It is important to remember that there is no a priori reason why the relation of indirect object in Swahili should be identical to that in English and other languages. This is the crunch. What functions syntactically as a single category of indirect object in English does not seem to do so in Swahili.

Consider the sentences in (21) through (23).

(21) Mwalimu---a----li----ni----onyesha kitabu.
teacher--s.m.-tns.---me----show book
'The teacher showed me a book.'
(22) Ni----li----onyeshwa kitabu na mwalimu
I----tns.---show-pas. book by teacher
'I was shown a book by the teacher.'
(23) *kitabu----ki----li----ni----onyeshwa na mwalimu
book------s.m.--tns.--me----show-pas. by teacher
'The book was shown to me by the teacher.'

As we saw before in (16) through (18), only the NP traditionally called the indirect object can be passivized when there is also a direct object present. Besides the relational grammar approach, one possible explanation is that only animate NP's can be passivized. But consider what happens in sentences (24) to (26) where both object NP's are animate:

(24) Mfalme a----li----wa---pa maaskari mtumwa
king s.m.---tns.--o.m.-give soldiers slave.
'The King gave the soldiers a slave.'

(25) Maaskari wa----li----pewa mtumwa na mfalme
soldiers s.m.---tns.-give-pas. slave by king
'The soldiers were given a slave by the king.'

(26) *Mtumwa a---li-----pewa maaskari na mfalme.
slave s.m.-tns.-give-pas. soldiers by king.
'The slave was given to soldiers by the king.'

In sentence (24) maaskari triggers the presence of the object agreement marker wa in the verb. Maaskari has been acceptably passivized in (25) and the ungrammatical (26) demonstrates that mtumwa, 'slave', cannot be passivized, even though it is an animate NP. (26) is fine on the reading 'soldiers were given to the slave by the king' where slave has been topicalized, but this reading comes from a source other than that of (25). I will call NP's such as maaskari in (24) to (26) which express the notion of being the recipient of some action 'donatives'. They are similar to to-datives in English.

Another type of indirect object is the benefactive, which expresses the idea that an action is performed for the NP in question. This was illustrated in (16) and (17) and can also be seen in (27).

(27) Mwalimu a----li---ni--onyeshea Ali kitabu.
teacher s.m.-tns.--me--show appl. Ali book
'The teacher showed Ali a book for me.'

In (27), the only passivizable NP is the benefactive ni meaning 'for me'. This is shown in (28).

(28) Ni--li---onyeshewa Ali kitabu na mwalimu
I--tns.--show--pas. Ali book by teacher
'For me was shown to Ali a book by the teacher.'

Passivization of either Ali, the donative, or kitabu, the direct object, results in an ungrammatical sentence. This is shown in (29) and (30).

(29) *Ali ni---li---onyeshewa kitabu na mwalimu
Ali I---tns.--show--p.a. book by teacher
'Ali was shown the book for me by the teacher.'

(30) *Kitabu ki----li---ni---onyeshewa Ali na mwalimu.
book s.m.--tns.--me--show--p.a. Ali by teacher.
'The book was shown to Ali for me by the teacher.'

Consider another set of examples:

(31) Juma---a-----li---wa-----pelea wazee mtoto mbwa.
Juma--s.m.--tns.--o.m.-give-appl. parents child dog.
'Juma gave the dog to the child for the parents.'

(32) Wazee wa----li---pel---_ewa_ mtoto mbwa na Juma.
parents s.m.--tns.--give--p.a. child dog by Juma
'For the parents was given the dog to the child by Juma.'

(33) *Mtoto---a---li----pel---_ewa_ wazee mbwa na Juma
Child--s.m.-tns.--give--p.a. parents dog by Juma
'The child was given a dog for the parents by Juma.'

(34) *Mbwa-----a----li---pel---_ewa_ wazee mtoto na Juma.
the dog-s.m.-tns.--give--p.a. parents child by Juma.
'The dog was given to the child for the parents by Juma.'

As these sentences show, when the benefactive, donative, and direct object co-occur, only the benefactive may be passivized. This cannot be due to the animacy of the benefactive, since all three NP's in question are animate.

Now let us consider a third type of object NP which is illustrated in (35).

(35) Mtoto a----li---m-----kimbilia mama wake.
Child s.m.-tns.--o.m.--run mother his.
'The child ran towards his mother.'

(36) Mama----a----li---kimbil_iwa_ na mtoto.
Mother-s.m.-tns.--run--p.a. by child
'The mother was run towards by the child.'

Mama in (35) is an example of a directional object, and it is passivizable, as shown in (36). It is the object in whose direction a particular action is performed.

(37) illustrates the situation where there is both a direct and a directional object.

(37) Yule mchawi---a--li----wa----tup---_ia_ watoto
the wizard--s.m.-tns.--o.m.--throw-appl.children
'The wizard threw a rock at the children.'
majabali
rock.

Watoto is the directional object and it triggers the object agreement marker _wa_ in the verb. In this sentence, only the directional object is passivizable. _Majabali_, the direct object, is not. This is shown in (38) and (39).

(38) Watoto----wa----li------tup_iwa_--majabali na yule
children-s.m.--tns.--throw-p.a.-rock by the
'The children were thrown a rock at by the wizard.'
mchawi.
wizard

(39) *Majabali-ya---li----tup-_iwa_---watoto na yule mchawi.
rock----s.m.-tns.--throw-p.a.-children by the wizard
'A rock was thrown at the children by the wizard.'

Again, to demonstrate that this situation is not merely the result of the animacy distinction, consider sentences (40) to (42), which have two inanimate object NP's.

(40) Mtu---a-----li----tup----ia mlango jiwe
Man--s.m.--tns.--throw-appl. door stone
'A man threw a stone at the door.'
(41) Mlango---u----li---tup---iwa jiwa na mtu.
door---s.m.--tns.-throw-p.a. stone by man
'A door was thrown a stone at by a man.'
(42) *Jiwe li----li---tup---iwa mlango na mtu.
stone s.m.--tns.-throw--p.a. door by man
'A stone was thrown at a door by a man.'

As (41) and (42) show, only the directional object can be passivized when it co-occurs with a direct object.

Further examples are given in (43) to (45).

(43) Mtu----a----li----m----tup-ia paka panya.
Man--s.m.--tns.-o.m.-throw-appl. cat mouse
'The man threw a mouse to the cat.'
(44) Paka a----li---tup-iwa panya na mtu.
cat s.m.-tns.-throw-p.a. mouse by man
'The cat was thrown a mouse by the man.'
(45) *Panya a----li----tupiwa paka na mtu.
mouse s.m.-tns.-throw-p.a. cat by man
'A mouse was thrown to the cat by the man.'

In these sentences with two inanimate NP's, again only the directional object is passivizable.

4. The passivization hierarchy

We have looked at four different types of objects: direct, donative, benefactive, and directional. The latter three have in common the fact that they may generally be expressed by the applied form, although this is not apparent in all the examples, since when there are two or more indirect-type objects, only one may be expressed by the applied.

It is possible to form a hierarchy of what is passivizable in Swahili as shown in (46).

(46) benefactive

donative
directional

direct object

When two or more NP's are present in a sentence, the NP highest on the hierarchy takes precedence for the purposes of passivization. The donative and the directional are grouped together on the hierarchy because they seem to be mutually exclusive. It is pragmatically impossible to perform an action such that its recipient and its directional goal refer to different things. The benefactive and the directional can co-occur, but in this case, the benefactive, which is the NP higher up on the hierarchy, takes the applied form. The directional shows up as the object of the preposition kwa. In this position the directional cannot be passivized.

5. Conclusion.

What these facts make clear is that the benefactive, donative, and directional are semantically and syntactically distinct categories and that for at least the purposes of passivization, they cannot be lumped together in a single category of "indirect object."

One could try to save the relational grammar approach by positing a rather abstract rule or rules which would convert the different "indirect objects" to II's in surface structure, but this runs into problems. The sole motivation for positing this type of rule is the desire to maintain the universal claim that only II's passivize. Also, in order to determine which NP this type of rule would apply to in sentences with more than one object NP, it would still be necessary to refer to the hierarchy. It seems much more reasonable to assume that what passivization itself applies to is determined by the hierarchy.

A task for further research will be to see if there is any substantive semantic or pragmatic basis for this hierarchy, other than the animacy distinction, which is not significant in all cases.

Footnotes

*I am deeply indebted to my informant, Mohammed I. Absheikh for his grammaticality judgments and helpful comments. I am also indebted to Peter Cole, Gerry Dalgish, and Aleks Steinbergs for their comments and suggestions.

[1] Abbreviations:

s.m.	subject marker
o.m.	object marker
tns.	tense
pas.	passive
appl.	applied form
p.a.	passive applied
v.d.a.	verb denoting action

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.270-278 (1975)

A Constraint on Complements in Swahili*

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1. Introduction

In his article "Surface structure constraints in syntax", Perlmutter (1970) discusses a surface structure constraint on the order of clitic pronouns in Spanish. This constraint performs a filtering function in that sentences in which the clitics do not conform to the constraint are discarded as ungrammatical. This constraint applies to the output of the transformational component, and no transformations apply after the constraint filters out the ungrammatical sentences. In this paper I will argue that Swahili grammar also contains a surface structure constraint which serves to filter out ungrammatical sentences. It may be stated as:

(1) $*_{NP}[S]\ VP$

I will also demonstrate that Swahili grammar contains three rules, Extraposition, Pseudo-Clefting, and Nominalization, which function to prevent surface structures with sentential subjects from being derived.

The following sentences illustrate the type of sentences with which this paper is concerned. The (a) sentences are ungrammatical in Swahili, and the (b) sentences, the result of the application of some rule to the (a) sentences, are grammatical.

(2) a. *Kuwa alikuja ilinishangaza.
That he-came surprised-me.
'That he came surprised me.'
b. Ilinishangaza kuwa alikuja.
It-surprised-me that he-came.
'It surprised me that he came.'

(3) a. *Kuwa kuwa nilimwona jana ni kweli
That that I-saw-him yesterday is true
iliwafura hisha.
made-them-happy.
'That that I saw him yesterday is true made them happy.'
b. Iliwafurahisha kuwa ni kweli kuwa nilimwona
It-made-them-happy that is true that I-saw-him
jana.
yesterday.
'It made them happy that it is true that I saw him yesterday.'

(4) a. *Kuwa alikuja ilinishangaza.
That he-came surprised-me.
'That he came surprised me.'
b. Lililonishangaza ni kuwa alikuja.
(The thing)-which-surprised-me is that he-came.
'What surprised me is that he came.'

(5) a. *Kuwa alifika mapema ni vizuri.
That he-arrived early is good.
'That he arrived early is good.'
b. Lililo zuri ni kuwa alifika
(The thing)-which-is good is that he-arrived
mapema.
early.
'What is good is that he arrived early.'

(6) a. *Kuwa alikuja ilinishangaza.
That he-came surprised-me.
'That he came surprised me.'
b. Kuja kwake kulinishangaza.
Coming his surprised-me.
'His coming surprised me.'

(7) a. *Kuwa alisoma ilimsaidia.
That he-studied helped-him.
'That he studied helped him.'
b. Kusoma kwake kulimsaidia.
Studying his helped-him.
'His studying helped him.'

In each case the (a) sentence contains a complement in subject position, and in the (b) sentence that complement has been eliminated from subject position. Thus, it appears that the ungrammaticality of the (a) sentences lies in the occurrence of the complements in subject position. As seen in (2), (4), and (6), this filtering process involves at least three rules, each of which can act independently to remove a complement from subject position, thus making the sentences grammatical.

2. Discussion of the rules

a. The first rule, Extraposition, can be shown to exist in Swahili by demonstrating its interaction with another rule, Passive, which is definitely in the grammar of Swahili. This will be shown from the underlying structure, Figure I, to which agreement has been applied and the kuwa complementizer inserted, presumably transformationally. Fulani has been chosen as the equivalent of the abstract agent 'someone' in English. If it were assumed that Extraposition preceded Passive, the result of the application of Extraposition on the S_1 cycle gives Figure II and sentence (8).

Figure I.

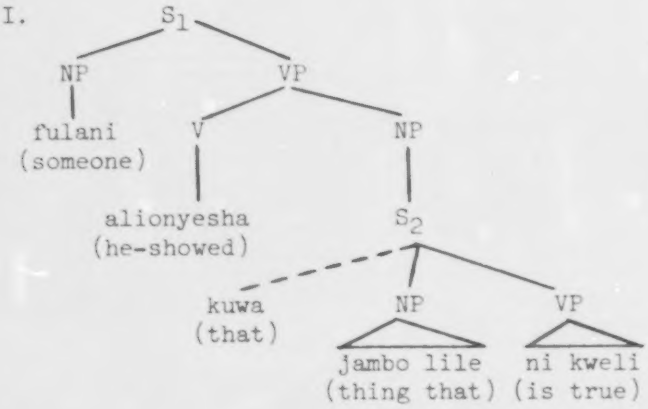
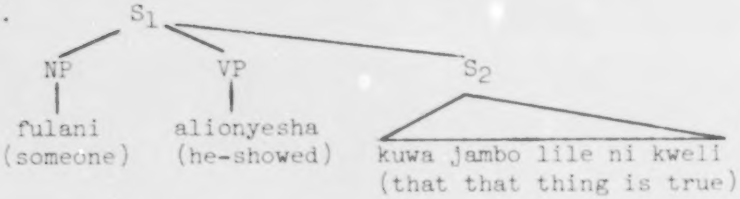

S1
NP
VP
fulani
(someone)
V
NP
alionyesha
(he-showed)
S2
kuwa
(that)
NP
VP
jambo lile
(thing that)
ni kweli
(is true)

Figure II.


S1
NP
VP
S2
fulani
(someone)
alionyesha
(he-showed)
kuwa jambo lile ni kweli
(that that thing is true)

(8) Fulani alionyesha kuwa jambo lile ni kweli.
Someone showed that thing that is true.
'Someone showed that that thing is true.'

Now, however, Passive cannot apply to this structure, as the NP which dominated S_2 is deleted with the application of Extraposition. This would eliminate the derivation of a possible sentence from I. sentence (9).

(9) Ilionyeshwa (na fulani) kuwa jambo lile ni kweli.
It-was-shown (by someone) that thing that is true.
'It was shown that that thing is true.'

This sentence could not be generated by the above ordering of Extraposition and Passive. If, however, the order is reversed, this sentence results from Passive being applied first on S_1, giving the ungrammatical (10).

(10) *Kuwa jambo lile ni kweli ilionyeshwa (na fulani).
That thing that is true was-shown (by someone).
'That that thing is true was shown.'

Then Extraposition applies, giving the desired (9).

(9) Ilionyeshwa na fulani kuwa jambo lile ni kweli.

In the step preceding (10) an agreement transformation has applied, changing the subject prefix on the verb from a- to i-. Verbs with sentential subjects take the i- (Class 9) prefix. This agreement rule must apply each time the subject of a verb is changed, since if this were not the case there would be no way to obtain the *i-* prefix on *ilionyeshwa*, as Extraposition would have moved its subject. The result would have been sentence (11) if the subject sentence had been moved before the application of agreement.

(11) *Alionyeshwa kuwa jambo lile ni kweli.
(ungrammatical with this meaning)

So, in order to be able to generate all possible sentences in Swahili, Passive must precede Extraposition, and since Extraposition applies to the output of an independently motivated rule, it must be a rule in Swahili.

b. The second rule is considered to be a Pseudo-Clefting rule, though no attempt will be made to formalize it. This rule relates the following (a) and (b) sentences, which are paraphrases.

(12) a. Anapenda kwenda shule.
He-likes to-go (to) school.
'He likes to go to school.'
b. Analopenda ni kwenda shule.
(The thing)-which-he-likes is to-go (to) school.
'What he likes is to go to school.'
(13) a. Kitabu changu ni kikubwa.
Book my is big.
'My book is big.'
b. Kilicho kikubwa ni kitabu changu.
(The thing)-which-is big is book my.
'What is big is my book.'

This rule must also follow Passive. Figure I on the preceding page is the underlying form from which this will be determined. Pseudo-Clefting may apply on S_2 giving *Lililo kweli ni jambo lile*, but it is the S_1 cycle that is important in this argument. If it were assumed that Pseudo-Clefting preceded Passive, the result of its application on S_1 gives

(14) Aliloonyesha ni kuwa jambo lile ni
(The thing)-which he-showed is that thing that is
kweli.
true.
'What he showed is that that thing is true.'

Passive can no longer apply because the copula verb *ni* cannot be passivized. There is, however, a passive sentence derivable from the above structure. It is only possible to generate this sentence if the rule of Passive precedes the Pseudo-Clefting rule. Passive and agreement applied on S_1 results in (15):

(15) *Kuwa jambo lile ni kweli ilionyeshwa na fulani.
That thing that is true was-shown by someone.
'That that thing is true was shown by someone.'

Now Pseudo-Clefting may apply, giving

(16) Lililoonyeshwa ni kuwa jambo lile
(The thing)-which-was-shown is that thing that
ni kweli.
is true.
'What was shown is that that thing is true.'

Therefore, Pseudo-Clefting must follow Passive, and exist as a rule in Swahili.

c. The third rule, Nominalization, is different from the other two rules in that it is not a movement rule. It is also much more restricted than the others. This transformation changes a sentence to a verbal noun complex, which becomes a noun phrase, with the sentence node and thus the complementizer being deleted. A verbal noun complex consists of the nominalization of a verb to what is actually its infinitive form, followed by a possessive agreeing in number and person with the original subject noun. If this was not a pronoun, the possessive or the word meaning 'of', kwa (agreeing with the verbal noun), will be followed by the original subject noun. This transformation is only possible with sentences that do not themselves embed a sentence, as it cannot occur where the subject noun phrase is complex. Also, nominalization cannot apply with the copula verb kuwa, nor the verb 'to have', kuwa na. Sentence (17) is ungrammatical in Swahili, though its equivalent in English is well-formed.

(17) *Kuwa kwetu wanafunzi kulimshangaza.
Being our students surprised-him.
'Our being students surprised him.'

In Swahili, an equivalent sentence would have to be expressed in the following manner:

(18) Ilimshangaza kuwa tulikuwa wanafunzi.
It-surprised-him that we-were students.
'It surprised him that we were students.'

To obtain this sentence, Extraposition has applied to the original structure.

It is possible to show that the result of Nominalization is a noun phrase and not a sentence; that is, that the sentence node deletes as a result of the application of the rule. First, Extraposition, which moves sentences, cannot apply to a sentence that has undergone Nominalization. Thus, (19) is ungrammatical.

(19) *Ilinishangaza kuja kwake.
It-surprised-me coming his.
*'It surprised me his coming.'

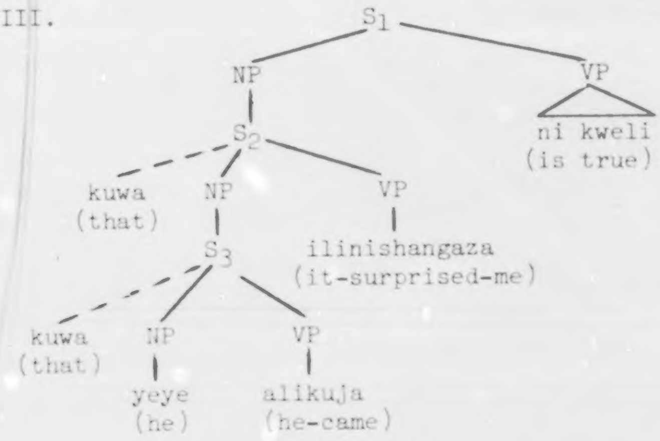
Second, when these verbal noun complexes are in subject position, the subject prefix on the verb is ku-, agreeing with the noun phrase, and not i-, which is the subject prefix used on verbs which have sentential subjects.

(20) a. *Kupika kwake ilikuwa nzuri.
Cooking his was good.
'His cooking was good.'
b. Kupika kwake kulikuwa kuzuri.
Cooking his was good.
'His cooking was good.'

3. Role of the rules in removing subject complements

It will be shown from Figure III how each of the rules acts to eliminate complements from subject position, thereby forming grammatical sentences.

Figure III.



With no transformations other than agreement and kuwa insertion applied to this structure, the sentence is ungrammatical, as predicted by (1).

(21) *Kuwa kuwa alikuja ilinishangaza ni kweli.
That that he-came surprised-me is true.
'That that he came surprised me is true.'

First it will be shown how Extraposition moves complements from subject position. Since Extraposition moves embedded sentences, it cannot apply on the S_3 cycle. Moving to the S_2 cycle, its application there gives the ungrammatical (22).

(22) *Kuwa ilinishangaza kuwa alikuja ni kweli.
That it-surprised-me that he-came is true.
'That it surprised me that he came is true.'

Also ungrammatical is the result of the application of Extraposition only on the S_1 cycle.

(23) *Ni kweli kuwa kuwa alikuja ilinishangaza.
Is true that that he-came surprised-me.
'It is true that that he came surprised me.'

Though the literal translations of the above sentences are grammatical in English, they are all ungrammatical in Swahili. The only possibility for producing a grammatical Swahili sentence from Figure III using only Extraposition is to apply that rule on both the S_2 and S_1 cycles. This gives

(24) Ni kweli kuwa ilinishangaza kuwa alikuja.
Is true that it-surprised-me that he-came.
'It is true that it surprised me that he came.'

As in English, Extraposition in Swahili has the constraint that a sentence cannot be moved more than one sentence up to the right. Therefore, extraposition of S_3 to S_1 produces an ungrammatical sentence.

(25) *Kuwa ilinishangaza ni kweli kuwa alikuja.
That it-surprised-me is true that he-came.
*'That it surprised me is true that he came.'

Similarly, if S_3 is extraposed to S_1 and then S_2 is moved to S_1, the result is ungrammatical.

(26) *Ni kweli kuwa alikuja kuwa ilinishangaza.
Is true that he-came that it-surprised-me.
*'It is true that he came that it surprised me.'

These sentences are all ungrammatical, except (24), because they violate the surface structure constraint. Only when all subject complements are extraposed do the sentences become grammatical.

Next it will be shown how Pseudo-Clefting works to remove subject complements. This rule applied to S_3 gives an unacceptable sentence.

(27) ?Aliyekuja ni yeye.
(He)-who-came is him.
'He who came is him.'

This is probably because of the pronoun feature on the subject noun, as a similar sentence with a non-pronoun subject is acceptable.

(28) a. Mwalimu alikuja.
Teacher he-came.
'The teacher came.'
b. Aliyekuja ni mwalimu.
(He)-who-came is teacher.
'He who came is the teacher.'

Assuming that Pseudo-Clefting does not apply on S_3, its application on S_2 gives

(29) *Kuwa lililonishangaza ni kuwa
That (the thing)-which-surprised-me is that
alikuja ni kweli.
he-came is true.
'That what surprised me is that he came is true.'

Again, there is a complement in subject position causing the sentence to be ungrammatical. Pseudo-Clefting can now apply on S_1 giving

(30) Lililo kweli ni kuwa lililonishangaza
(The thing)-which-is-true is that (the thing)-
ni kuwa alikuja.
which-surprised-me is that he-came.
'What is true is that what surprised me is that
he came.'

The complement has been moved from subject to object position. The non-application of Pseudo-Clefting on S_2 would result in an ungrammatical sentence.

(31) *Lililo kweli ni kuwa kuwa alikuja
(The thing)-which-is true is that that he-came
ilinishangaza.
surprised-me.
'What is true is that that he came surprised me.'

Pseudo-Clefting, then, applies to allow derivation of sentences which would otherwise be filtered out by the surface structure constraint.

Nominalization, as was seen in (6) and (7), removes the sentence node from subject position. Thus, this rule also acts as one of the rules that function to support the surface structure constraint.

4. Conclusion

It has been shown that Swahili grammar must contain a surface structure constraint, (1), which filters out sentences containing sentential subjects. It has also been shown that Swahili contains three rules, Extraposition, Pseudo-Clefting, and Nominalization, which function to remove sentences from subject position, allowing for the derivation of grammatical sentences which otherwise would be filtered out by the surface structure constraint. Since all sentences conforming to (1) are ungrammatical, this fact could be accounted for by making each of the three rules obligatory. However, the same fact can be stated simply by the constraint (1), and since this requires only one statement of this fact about Swahili, it is much more desirable in a grammar than a condition on three separate rules.

Footnote

*I would like to express my thanks to Professor Frederick Newmeyer of the University of Washington for his critical reading of the earlier and final drafts of this paper and for helpful discussions of theoretical issues. I would also like to thank Professor Carol Eastman, also of the University of Washington, for her help with questions relating to Swahili and stimulation in the area of linguistic research on Swahili.

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Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.279-293 (1975)

Variation in the Krio Speech Community[*]

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1. Introduction

In refining the revolutionary framework which he had introduced a decade earlier, Chomsky (1965:3) explicitly proposed that the domain of the theoretical linguist was the language of "an ideal speaker-listener, in a completely homogeneous speech-community." For many who were to work within the Chomskyan paradigm, it was found that such a domain was too narrowly defined and that it tended to exclude from our consideration a substantial number of facts. The only kind of variation formally accounted for in the Standard Theory was stated in terms of optional rules, which characterize synonymy in syntax and 'free variation' in phonology.

In stating the goal of their paper, Elliott, Legum, and Thompson (1969) state:

> What we would like to show here is that variation, particularly of the very subtle types which exist among speakers who apparently have the same dialect, must be considered part of our data, because variation is a fact, and any theory of language which ignores it cannot be as complete as one which does not.

It is clear from this statement that, at least for these three writers, the dictates of Standard Theory and its formalism are not sufficient for an adequate account of our data.[1] The works of Labov, DeCamp, C-J. Bailey, Bickerton and others have demonstrated beyond a doubt that linguistic variation must be a central concern of the theoretical linguist, if for no other reason, because of its vital role in historical change.

This paper will describe the variation found in two subsystems of the Krio language of Sierra Leone. The first subsystem to be discussed concerns the rule of Negative Concord, whereas the other the other involves a particular set of prepositions. By plotting such variation on implicational tables of the type refined by Bickerton (1973), I intend to demonstrate the utility of such tables as devices for deepening our understanding of variational phenomena.

Investigations into the variation found in various creole languages have prompted the researchers to refer to the phenomenon as a continuum since there appears to be an infinite number of variants between the official language and the most conservative form of the creoles. The study of Jamaican Creole (DeCamp 1971) and Guyanese Creole (Bickerton 1972, 1973) have demonstrated that a great deal of variation is found in the auxiliary and pronominal systems. Since this variation is indicative of change-in-progress, and since the changes are obviously in the direction of the official language of the state (English in these two cases), the term 'decreolizing' seems to be quite an appropriate label for the process which they are undergoing. However, the term is only appropriate for those situations in which the language is undergoing very drastic changes, resulting in restructuring of the grammar. The implication is that the creole language will eventually merge with the official language.

With regard to the Krio data, no such drastic evolution is in sight. We find *virtually* no variation in the auxiliary or pronominal systems, and *absolutely* no variation involving the replacement by properly inflected forms of English auxiliaries or gender distinction in pronominal forms. Some of the variation which is found, however, does involve the substitution of English items for certain conservative Krio items. Though there is a level of Krio which is highly anglicized, it cannot be mistaken for English. In other words, Krio does not appear to exemplify a true continuum situation.

2. *Negative concord in Krio*

Before I present the data and discussion of the variation found with regard to the Krio rule of *Negative Concord*, a few comments on methodology are in order. The citations to be offered here were elicited from native Krio speakers who came from a wide range of age groups, educational backgrounds, occupations, etc.[2] I compiled a questionnaire of as many English sentence and construction types as possible without making the questionnaire unwieldy. Though the proponents of variation theory insist upon the collection of unmonitored speech as the only 'real' linguistic data, I feel my methodology was justified by the need for comparable data on numerous construction types for a large number of speakers. It was often the case that in a 35-40 minute recording of a speaker's narrative or story-telling style, none of the features being investigated appeared. The consequences of collecting *only* this kind of data will be elaborated on later in the paper.

The rule of *Negative Concord* is a rule which marks any occurrence of an indefinite quantifier with the feature [+NEG] in any sentence containing [+NEG]. An approximation of the rule is given in (1).

(1) *Negative Concord*

$$\begin{array}{ccccccccc} X & - & [+NEG] & - & Y & - & \left[\begin{array}{l}+INDEF.\\ +QUANT.\end{array}\right] & - & Z \\ 1 & & 2 & & 3 & & 4 & & 5 \end{array} \Rightarrow \begin{array}{ccccc} 1 & 2 & 3 & \underset{[+NEG]}{4} & 5 \end{array}$$

Though it is assumed that this rule was once an obligatory rule, the variable output of this rule defies such a label in present-day Krio. Sentences (2)-(6) exemplify this variable output.

(2) 'I don't remember anything that happened'
a. a nɔ mɛmba natiŋ we bin bi egɛn (B)
(I NEG remember nothing REL PAST BE anymore)
b. a nɔ mɛmba ɛnitiŋ we apun
(I NEG remember anything REL happen)
(3) 'I promised not to tell anyone'
a. a dɔn promis se a nɔ go tɛl nɔbɔdi (B)
(I COMPLET promise COMP I NEG FUT tell nobody)
b. a dɔn promis se a nɔ go tɛl ɛnibɔdi (F)
(I COMPLET promise COMP I NEG FUT tell anybody)
(4) 'I don't have any clothes to wear'
a. a nɔ gɛt nɔn klos fɔ wɛr (D)
(I NEG have none clothes INFIN wear)
b. a nɔ gɛt ɛni klos fɔ wɛr (J)
(I NEG have any clothes INFIN wear)
(5) 'I don't want anybody to tell me anything about anything'
a. a nɔ want nɔbɔdi fɔ tɛl mi natiŋ bɔt
(I NEG want nobody INFIN tell me nothing about
natiŋ (I)
nothing)
b. a nɔ want ɛnibɔdi fɔ tɛl mi ɛnitiŋ bɔt
ɛnitiŋ (J)
(6) 'Nobody wanted to tell me anything'
a. nɔbɔdi nɔ want (fɔ) tɛl mi ɛnitiŋ
(nobody NEG want INFIN tell me anything)

If every speaker produced and accepted both variants, there would be justification for labeling the rule merely as optional. This is not the case. We find that given a specific stimulus (e.g., English sentence (2)), one speaker may apply the rule whereas another speaker will not. On the other hand, some speakers consistently either apply the rule or don't apply the rule, regardless of the environment, while still others may or may not apply the rule in the same environment.

Adopting the strongest hypothesis, that all variation is rule governed, it was necessary to search for the systematic relationships that would account for this variation. Since Negative Concord is a syntactic rule, in the Standard Theory sense, various syntactic environments were tested as possible conditioning factors for the application of this rule. After this failed to produce any insight into the problem, it was discovered that it was the lexical items themselves that conditioned the application of the rule. The rule was found to apply more frequently to the quantifier any, less frequently to anything and least of all to anybody.

Having isolated the conditioning factors, this variation can be illustrated by an implicational table, as in Table 1. Implicational tables, first suggested by DeCamp (1971) and improved upon by Bickerton (1973), are a means of graphically illustrating the distribution of systematically related variants in terms of the significant environments for the individual speaker. Occurrence of the least prestigous (or basilectal) form is indicated by a 1, whereas the most prestigous (or acrolectal) form is indicated by a 2. The appearance of 12 in the same cell indicates a rule conflict. A rule conflict may be seen as an indecision in the speaker's grammar as to the appropriateness of the application of the rule.

TABLE 1
The Distribution of Negative Concord Rule with respect to Indefinite Quantifiers. Scalability = 80%

	ENVIRONMENTS		
	I	II	III
Speakers	any	anything	anybody
A	1	1	1
B	1	1	1
C	1	1	1 2
D	1	1	1 2
E	1	1	1 2
F	1	1 2	2
G	1 2	① 2	① 2
H	2	① 2	① 2
I	2	① 2	① 2
J	2	2	2

Though the actual setting up of such a table is primarily a mechanical process, Bickerton has proposed a test for their well-formedness or validity, a scalability index. The index is arrived at by dividing the number of non-deviant cells by the total number of cells filled. A deviant-free table would be 100% scalable. To quote Bickerton (1973:647):

> In practice, figures around 90% can be regarded as adequate, since chance scalability for three-place tables (e.g. containing 1, 12, and 2 as possible indices) is about 66%.

Deviants (circles in Table 1), in Bickerton's terms are occurrences of 1's to the right of a 2 in the same row (i.e. for the same speaker). These deviants are so-called not in that they are ill-formed or unacceptable utterances, but in terms of Bickerton's Normal Implication Conditions (1973:647), which I state here:

(7) Normal Implication Conditions
the presence of a basilectal index alone in a given column implies the presence of similar indices in all columns to left; while the presence of a non-basilectal index, alone or otherwise, implies the presence of similar indices, alone or otherwise, in all columns to the right.

In other words, a deviant is an index which does not meet the expectations of these conditions.

It will be noted that though the scalability index on Table 1 is safely above the chance scalability index of 66% it is well below the figures usually considered to be adequate by Bickerton. My tables are more highly constrained in two respects. First, the nature of Bickterton's unsystematic data collection forces him to construct tables with a large percentage of the cells unfilled.[4] Since all of the cells are filled in Table 1, there is a greater chance for deviants to appear, bringing the scalability index down. Secondly, Bickerton allows himself what might be referred to as a "squelch control device." A number of candidates for deviancy are given non-deviant status if they are close to an area of high concentration of other tokens of the same index. For example, looking at Table 1 we find in Column II three deviants for speakers G, H, and I. Since these 1's are relatively close to other, non-deviant 1's, I am assuming that Bickerton would grant them non-deviant status. To accept two of these as non-deviant would bring the scalability up to 86.6%.

Returning to the data, it was observed that, though the majority of the speakers in this sample maintain the rule of Negative Concord to some extent, the rule had a more restricted application for some than for others. For some the rule is downward bounded whereas for others the rule is unbounded. Many of those who would be labeled as 'basilectal', due to their frequent application of the rule, do not allow the rule to apply to indefinite quantifiers in embedded S's.

This fact gives us added insight into this particular change. The speakers who maintain the unbounded form of the rule are over 55 years old, while those who maintain a bounded rule range from 60 to 19. On the basis of this alone it seems reasonable to assume that the unbounded form of the rule is the oldest.[5]

Three stages may be hypothesized in the history of the ongoing loss of Negative Concord:

(8) Three Stages in the Loss of Negative Concord
I. Negative Concord (unbounded)
II. Negative Concord (bounded)
III. No Negative Concord

It cannot be too strongly emphasized here that none of the stages are static stages, since all three are represented by speakers in the contemporary speech community. The most dynamic change in progress is taking place between stages II and III. Table 1 demonstrates that the rule of Negative Concord is being lost first with regard to the lexical item anybody, secondly with regard to anything and lastly with regard to any.

This process brings to mind William Wang's (1969) article in *Language*, in which he discussed the notion of lexical diffusion in phonological change. His hypothesis that residue arises from intersecting competing processes was dependent on his assumption that phonological changes move gradually through the lexicon. Here we see an example of a syntactic change moving through a lexical subset. The implication of such findings is that a number of syntactic exceptions may be explainable in terms of syntactic changes which are dependent on certain lexical features, but which have not yet reached all such items in the lexicon.

In an article entitled "Productivity in phonology", Paul Kiparsky (1973) suggests two possible analyses as explanation for a set of facts in the phonological history of Finnish. Though the whole argument is too involved to present here, his preferred solution was one in which the major rule in question (t → s/___i) eliminated the rule exception features on a number of verbs, thus simplifying the grammar by allowing the rule to apply more generally. His major objection to the second solution was that it tended to add exception features to lexical items, which he claimed to be a highly unexpected kind of change.

It should be noticed that this latter kind of change is exactly the change we see with regard to the loss of the Negative Concord rule. The speaker must first mark the lexical item anybody with the exception feature and then anything and then any. Presumably, after the rule has been lost completely, all exception features for that rule would somehow be erased.

A very strong hypothesis that can be extracted from Kiparsky's paper is the following:

> Linguistic change proceeds in such a way as to eliminate, not add, rule exception features, thus simplifying the grammar.

The Krio data presented above represents a clear counterexample to such a claim about the nature of historical change. Thus, Kiparsky's arguments for his preferred solution are weakened considerably.

3. Prepositions in Krio

Whereas only two variants were found to be operating within the Negative Concord variation subsystem, the prepositional cases are more complex, in that we often find multiple variants. Although a fairly large set of prepositions is to be found in Krio, only three were observed to be participating in variation. The three prepositions which concern us here are 'from', 'of', and the instrumental 'with'.

For ease of exposition, each of the three will be discussed separately before discussing them together as a subsystem within the language. Let us first consider the instrumental 'with'. The following sentences examplify the two variants observed:

(9) 'I cut the meat with a knife.'
a. a tek nɛf kɔt di bif (E)
(I take knife cut the meat)
b. a kɔt di bɨf wit nɛf (C)
(I cut the meat with knife)
(10) 'What do you make rice bread with?'
a. wɛtin yuna de tek mek raysbred? (B)
(what you-pl PROGR take make ricebread)
b. wɛtin yu de mek raysbred wit? (H)
(what you PROGR make ricebread with)
(11) 'He hit the boy with a stick.'
a. na tik i tek bit di boy (I)
(COP stick he take strike the boy)
b. i bit di bɔbɔ wit tik (F)
(he strike the boy with stick)

Here we find alternation between wit, the Krio phonetic realization of the English preposition, and a serial verb construction involving the verb tek. The use of the verb 'take' in conjunction with a noun to denote 'instrumentality' is a common feature of the Kwa languages. In an earlier paper (Williams 1971) I suggested that such serial verb constructions originated from a Yoruba semantic structure. The speakers of that language played an extremely signifcant role in the development of Krio. Since it is assumed that this change is moving in the direction of the more prestigous language, we are witnessing the replacement of the basilectal serial construction by an English preposition.

A large number of the citations containing the serial verb were sentences in which the object of the verb tek had been clefted (cf. (11a)). However, none of the sentences containing wit had a clefted element. Furthermore, it appears that the object of wit cannot be clefted. Though (12a) is a perfectly acceptable acrolectal form, (12b) sounds very stilted and (12c) is out of the question. (12d) presents itself as the only acceptable sentence in which the object of wit is clefted from (12a).

(12) 'He cut the meat with a knife.'
a. i kɔt di bif wit nɛf
(he cut the meat with knife)
b. *? ŋa nɛf i kɔt di bif wit
(COP knife he cut the meat with)
c. *na nɛf i kɔt di bif
d. na nɛf i tek kɔt di bif
(COP knife he take cut the meat)

I first hypothesized that there must be some restriction in Krio against the stranding of prepositions. This seemed like a reasonable explanation of the facts since similar restrictions are found on the locative preposition na. (13a) is a perfectly good sentence containing the preposition na. Note that when the object of na is clefted, the stranded preposition is deleted, yielding (13b). Sentence (13c) with the undeleted, stranded, preposition is unacceptable.[6]

(13) a. wi de go na makit 'We are going to
(we PROGR go LOC market) the market.'
b. na makit wi de go 'It's to the market
(COP market we PROGR go) we are going.'
c. *na makit wi de go na.

This hypothesis, however, is refuted by examples such as (10b) in which the preposition wit is stranded, but the sentence is acceptable. Since such occurrences are infrequent, a restriction against the stranding of prepositions seems to have at least nominal status in the grammar.

If we are forced to give up the 'no stranding of prepositions' hypothesis, other options are available to us. Another possibility is that the recognition of wit as a foreign item prevents the application of well-established optional rules to any member in the same phrase. This is not an unexpected kind of restriction, since the restriction against the application of certain well-motivated rules to foreign words is a well-known occurrence.[7]

The following responses were elicited for the preposition 'of':

(14) 'Two of the bananas have spoiled.'
a. tu pan dɛm banana dɔn pwɔyl (A)
(two of those banana COMPLET spoil)
b. tu di banana dɔn pwɔyl (C)
(two the banana COMPLET spoil)
(15) 'Three of the men went home early.'
a. tri pan dɛm man bin go om kwik (A)
(three of those man PAST go home quick)
b. tri ɔv dɛm man dɛm go om kwik (D)
(three of those man PL go home quick)

The three variants relevant here are:

pan, ɔv, and NUMBER + DET

Of the three pan and NUMBER + DET were taken to be the basilectal form whereas ɔv was taken as the acrolectal form. The only other point of interest with regard to this variant is that a number of times speakers merely disregarded the 'of' and produced a sentence containing the noun preceded by a number. In other words, rather than (15a) or (15b) they produced (16).

(16) tri man dɛŋ go om kwik (E)
(three man PL go home quick)

Whether this response was due to faulty hearing or whether it is a legitimate alternative was not determinable.

The last prepositional variable is 'from'. It turns out that the semantic range found in English is skewed in the Krio semantic structure in terms of the objects it takes. We find one set of forms before human objects and another set of forms before non-human objects. Observe the following utterances:

NON-HUMAN OBJECTS
(17) 'Take two oranges from the basket/calabash.'
a. go t k tu ɔrinc kɔmɔt na da kalbas. (A)
(go take two orange come-out LOC the calabash)
b. tek tu ɔrinc na di kalbas. (G)
(take two orange LOC the calabash)
c. tek tu ɔrinc insay di baskit (H)
(... inside ...)
d. go tek tu ɔrinc frɔm da kalbas. (F)
(18) 'One of us has stolen the money from the cash-box.'
a. na wan pan wi tif di mɔni kɔmɔt insay
(COP one of us steal the money come-out inside
di kyasbɔks. (D)
the cash box
b. na wan pan wi dɔn tif di mɔni
(COP one of us COMPLET steal the money
kɔmɔt na (H)
come-out LOC the cashbox)
c. wan pan wi, na wi dɔn tif di mɔni na di
yasbɔks (J)
d. wan pan wi dɔn tif da mɔni we de na da
kyasbɔks. (A)
(... REL BE LOC ...)

HUMAN OBJECTS
(19) 'Don't take that X from your brother.'
a. nɔ tek da wan de kɔmɔt frɔm yu
(NEG take DEM one there come-out from your
brɔda-o. (A)
brother)
b. nɔ tek da banana tu yu brɔda (B)
(NEG take DEM banana from your brother)
c. nɔ tek da banana de frɔm yu brɔda-o (D)
d. nɔ tek da banana kɔmɔt frɔm yu brɔda. (H)
e. nɔ tek da banana na yu brɔda in
(NEG take DEM banana LOC your brother his
an (I)
hand)

The variants of 'from' before a non-human object are:

(20) 1. (kɔmɔt) na
2. (kɔmɔt) insay
3. REL BE LOC (we de na)
4. frɔm

It should be noted that the forms with kɔmɔt are participating in a serial verb construction to convey the information, 'out from'. As far as I can determine, the first three forms on the list are all basilectal, while only frɔm is acrolectal. Although it is conceivable that there is an early stage in this change at which na and insay are being preferred over kɔmɔt na and kɔmɔt insay, I have no evidence to substantiate such a stage. Creoles with whom I have apoken about this feel that both forms are equally good Krio with perhaps a slight subtlety in meaning. At any rate, it is clear that a change from the basilectal forms to the acrolectal form results in a consequent loss of seriality in this area of the grammar.

The variants found to occur before a human object are:

(21) 1. (kɔmɔt) tu
2. (kɔmɔt) na PRON an
3. (kɔmɔt) frɔm

Here again we find that the only form which qualifies as acrolectal is the one containing frɔm. Notice in this case that the change from the basilectal form to the acrolectal form does not necessarily imply loss of seriality, since we do find examples of kɔmɔt frɔm. However, the large majority of the utterances containing frɔm are not accompanied by the serial construction.

Realizing the close relationship between basilectal serial verbs and acrolectal single prepositions I hypothesized that the variation found here might constitute a subsystem of the grammar and hence might be scalable. Table 2 illustrates the implicational scale arrived at.

The hypothesis that these prepositional variants constitute a subsystem of the grammar is indeed born out by Table 2. Notice that the semantic skewing of 'from' is shown to be a significant one in that the two divisions hold non-adjacent positions on the scale. This demonstrates quite effectively, I think, that, though the acrolectal form for both environments is the same, the environments themselves are still kept quite distinct as they are in the basilectal grammar. Whether or not this distinction will be maintained even after the complete take-over of 'from' is a matter of pure speculation.

Again in trying to account for the relatively low scalability index, I can only point out that since all of the cells in my tables are filled, there is a greater chance for deviants to appear. As in the first table, I have not exempted deviant 1's in proximity to areas with a high concentration of 1's as Bickerton has done. Candidates for such exemption in Table 2 are the circled 1's in Column II for F and D; those in Column III for B and C; and that found in column IV for J. Disregarding these 5 deviants, the scalability index jumps up to 87.5%.

TABLE 2.
Distribution of Prepositional Variants. Scalability = 75%.

Speakers	I	II	III	IV
E	1	1	1	1 2
A	1	1	1	1 2
J	1	1	1 2	① 2
G	1	1	1 2	2
I	1	1	2	① 2
H	1	1	2	2
B	1	1 2	① 2	① 2
C	1	1 2	① 2	2
F	1 2	① 2	①	① 2
D	1 2	① 2	① 2	2

I = 'from' non-human; II = 'of';
III = 'from' human; IV = 'with'

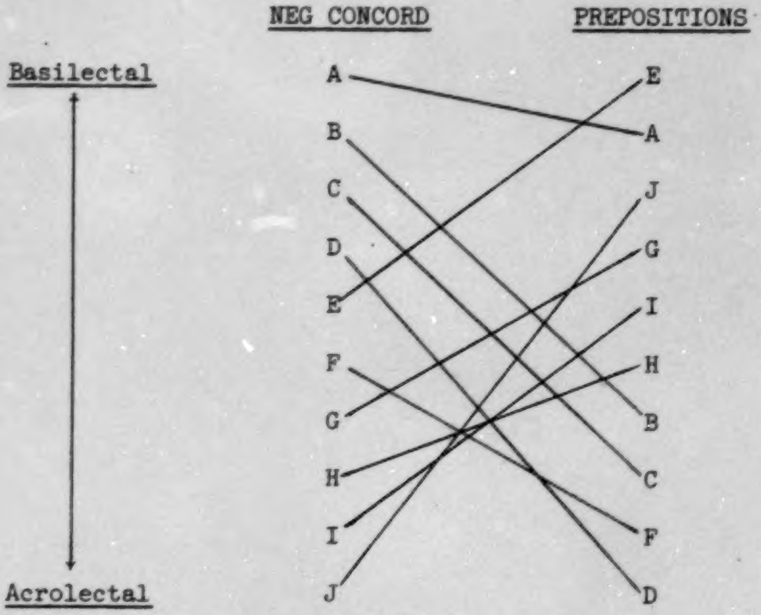
4. Further Observations

Though a number of people are presently working on variation, our knowledge of the true nature of variation, the relationship between one variant subsystem and another, and how variation is to be represented formally is miniscule. To my knowledge, no one has inquired into the relationship which obtains between variant subsystems within a speech community or whether these subsystems operate independently of each other. My data provides us with some indications of what the relationship is and suggests that this might be a fruitful area of further investigation.

Looking at Tables 1 and 2 we find that none of the speakers holds the same position in both tables. Speaker A, objectively and subjectively, the most 'basilectal' in the sample, has moved the least of all, from position one to position two. Diagram I more clearly illustrates the different positions of the speakers with regard to both variant subsystems.

The terms basilect and acrolect imply that there are two rather self-contained entities, two separable bodies of speakers each operating a grammar specifiably distinct with regard to some features of those grammars. Given such an assumption, we would expect to find that speakers who participate at the basilectal end of one variant subsystem will also participate at the basilectal end of the other variant subsystems within that language. Diagram I demonstrates that, at least with regard to the two variant subsystems considered here, this is not the case. On the contrary, it shows the continuum to be a very fluid system in which the terms basilectal and acrolectal are completely relative terms, meaningful only in relation to a specific variant subsystem and a particular individual or isolect. Further investigation into other variant subsystems for these same individuals will support or refute this hypothesis.

Diagram I.



Implicational tables, which are based on comparable data for all of the informants, like those presented in this paper, may give us insight into other interesting questions, especially those about the role of the individual in linguistic change. For instance, looking again at Tables 1 and 2, it appears to be the case that those who have numerous rule conflicts on one table have relatively stable configurations on the other table. If it were found to be the case, even after considering four or more variant subsystems, that speaker X actively participates (i.e. has numerous rule conflicts) in only one of those subsystems while the others remain relatively stable, one might suggest the following hypothesis:

> Tentative Hypothesis
> An individual may *actively* participate in only one variant subsystem in his language at any given time, other on-going changes being kept in push-down storage until the rule conflict is resolved.

Assuming that linguistic change is a learning process in which the individual actively learns new forms, new exception features, new rules, etc., we would expect to find a limit on the amount of effort an individual can relegate to such a task.

Until the comparison of multiple variant subsystems is attempted, this hypothesis remains conjecture. However, if such an hypothesis finds support, we might possibly have found a partial explanation for the gradualness rather than the immediateness of linguistic change.

5. Summary

In summary, I have described two variant subsystems of Krio. The use of implicational tables demonstrated that these variants are scalable which is indicative of change-in-progress. With the added requirement that implicational tables be fully specified, it was found that they can provide us with interesting insights into the nature of historical change. In order to fully specify such tables we must rely on more traditional methodology in collecting data, in addition to the "new methodology" described in the literature on variation. And though I suggested a number of areas of further research utilizing implicational tables, it must be remembered that such tables are not themselves analyses or formal statements of variation. Rather, they are useful devices for illustrating how a change progresses from one environment to another, and the degree of participation of the individual in such subsystemic changes.

Footnotes

*The research for this study was done under a fellowship granted by the Foreign Area Fellowship Program. However, the conclusions, opinions, and other statements in this publication are those of the author and are not necessarily those of the Fellowship Program.

[1] There are many who see no contradiction between Chomsky's narrowly defined domain and the recent attempts to describe and account for variational phenomena. It has been suggested to me that optional rules may be seen as a primitive attempt to account for just those facts which concern those who are studying variation in more detail. Since Chomsky's major concern is to discover what competence is, it is quite possible that his investigations might eventually have led him to a close study of variation. Since a number of Chomsky's statements are open to different interpretations, I will only state here that he appears to have excluded variational data from his corpus of consideration. However, further study of variation will reveal whether such data can be adequately described by an extension of the present formalism or whether the very nature of such data necessitates a completely different orientation.

[2] I am eternally grateful to my many informants and friends in Sierra Leone, without whose cooperation this study could not have been conducted. Special thanks goes to those people of

Leicester Village who were my neighbors as well as my daily informant-teachers.

[3] The capital letters in parentheses denote the speakers position on Table 1.

[4] See, for instance, Table 2 in Bickerton (1973:651).

[5] My present data is incomplete with regard to the unbounded rule, since the only utterances elicited with indefinite quantifiers in an embedded sentence (with NEG in the higher S) contained the lexical item *anything*. Whether or not the unbounded form of the rule operated variably or indifferently to the three indefinite quantifiers remains a question.

[6] The locative *nà* and the copula *nà* are homophonous, but are related in no other way.

[7] Charles Bird has suggested to me that if this is indeed the case, it provides us with syntactic evidence for the directionality of the change, in that *Cleft* applies freely to the older, serial verb construction, but not to the newer, English prepositional phrase.

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Symposium on African Language, Culture, and Society

April 11, 1975

Ohio State University

MORNING SESSION. Chair: William J. Samarin (Univerity of Toronto)

- István FODOR (Universität zu Köln)
  - Language Reform of Past Times and in Some African and Asian Countries.
- Paul KOTEY (University of Florida, Gainesville)
  - The Official Language Controversy: "Colonial" vs. Indigenous.
- Eyamba G. BOKAMBA (University of Illinois)
  - Authenticity and the Choice of a National Language: The Case of Zaire.
- C. J. Emeka OKONKWO (State University of New York, Buffalo)
  - A Function-oriented Model of Initial Language Planning in Sub-Saharan Africa.
- Maurice TADADJEU (Georgetown University)
  - Language Planning in Cameroon.
- Joshua A. FISHMAN (Yeshiva University)
  - Language Planning: Some Recent Theoretical and Empirical Developments.
  - Discussant: Gilbert ANSRE

AFTERNOON SESSION. Chair: Gayle Partmann (Oakland University)

- Bruce C. JOHNSON (University of North Carolina)
  - Stable Triglossia at Larteh, Ghana.
- Carol Myers SCOTTON (Yale University)
  - What Multilingualism Means in Lagos.
- Ekkehard WOLFF (Seminar für Afrikanische Sprachen und Kulturen, Hamburg)
  - The Conceptual Framework of Humboldtian Ethnolinguistics in West German Africanistics.
- Edgar C. POLOMÉ (University of Texas at Austin)
  - The Proto-Bantu Lexicon and Its Cultural Implications.
- M. L. BENDER (Southern Illinois University)
  - The Beginnings of Ethnohistory in Western Wellegga: The Mao Problem.
- William E. WELMERS (University of California, Los Angeles)
  - Historical Implications of the Vai Consonant System.

EVENING SESSION. Chair: Johanna DeStefano (Ohio State University)

- Clifford HILL (Columbia University)
  - Cognitive Variation in the Linguistic Encoding of Front-back Relations.
- Ihechukwu MADUBUIKE (Ohio State University)
  - African Literary Communications and the European Languages: The Case of Francophone African Writers in Senegal.
- Joyce A. OKEZIE (State University of New York, Buffalo)
  - Language Planning and Literacy Development: An African Example.
- Ayọ Bamgboṣe (University of Ibadan)
  - Mother Tongue Education in West Africa.

Sixth Conference on African Linguistics

April 12-13, 1975

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Herbert STAHLKE (Georgia State University)
An Argument Against Binary Features for Tone: Evidence from Igede and Proto-Mixtecan.
Robert W. WILKINSON (Northwestern University)
The Phonemic Status of Mid Tone in Ebolowa Bulu.
Sara GARNES (Ohio State University)
An Acoustic Analysis of Double Articulations in Ibibio.
Grover HUDSON (Southern Illinois University)
Paradigmatic Initiation of a Sound Change in Hadiyya.
Norbert NIKIEMA (Indiana University)
Vowel Length in Moore: Its Phonemic Status and Its Orthographic Representation.
Jacqueline WARNIER (University of Paris) and Jan VOORHOEVE (University of Leiden)
Vowel Contraction and Vowel Reduction in Mankon.
Gerry DALGISH (University of Illinois)
Nasal Interactions with Bantu Vowel-Initial Roots: The Morphological or Phonological Solution.

Session II: Syntax 1 (Afternoon, April 12, 1975)
Chair: Erhard F. K. Voeltz (Indiana University

Claude HAGEGE (Université de Poitiers and Université de Paris XII)
Some Contributions of Central African Languages to African Linguistics, Linguistic Theory and Language Universals.
M. Sorie YILLAH (Queens College, City University of New York)
Temne Complementation.
Amy MYERS (Queens College, City University of New York)
Complementizer Choice in Some Eastern Bantu Languages.
William R. GAINES (Indiana University)
Thematization and Relativization in Bambara.
Ayọ BAMGBOṢE (University of Ibadan)
Relative Clauses and Nominalized Sentences in Yoruba.
Roger EPEE (Cornell University)
The Case for a Focus Position in Duala.
James HOSKISON (Ohio State University)
Focus and Topic in Gude.

Session III: Afro-European Creoles (Afternoon, April 12, 1975)
Chair: Morris Goodman (Northwestern University)

Milford JEREMIAH (Morgan State College)
The African Element in Antiguan Creole.
Frederic G. CASSIDY (University of Wisconsin)
The Portuguese Element in Jamaican Creole.
Ian F. HANCOCK (University of Texas) and Peter GINGISS (University of Houston)
A Manding Substratum for the European-Related Atlantic Creoles.
Beatrice L. HALL (SUNY at Stony Brook), and R. M. R. HALL (Queens College, CUNY)
Haitian Creole Sandhi Phenomena.
Charles E. DeBOSE (Stanford University)
Creole Speech Communities.
Wayne R. WILLIAMS (Fourah Bay College, Freetown, Sierre Leone, and Indiana University)
Variation in the Krio Speech Community.
Esla Y. BYNOE-ANDRIOLO (Graduate Center, CUNY) and M. Sorie YILLAH (Queens College, CUNY)
Predicate Clefting in Afro-European Creoles.

Session IV: Historical and Comparative Studies (Morning, April 13, 1975)
Chair: Victoria Fromkin (University of California, Los Angeles)

Chet A. CREIDER and J. Peter DENNY (University of Western Ontario)
The Semantics of Noun Classes in Proto-Bantu.
Talmy GIVÓN (University of California, Los Angeles)
Focus and the Scope of Assertion: Some Bantu Evidence.
R. M. R. HALL (Queens College, CUNY), Beatrice L. HALL (SUNY at Stony Brook), Stephen A. ANTELL (Gradute Center, CUNY), Amy MYERS (Queens College, CUNY), and Lawrence P. SHEERIN (Graduate Center, CUNY)
Toward a Reconstruction of Proto-Nilotic Vocalism.
John M. STEWART (University of Edinburgh)
Lenis Stops and the Origins of Volta-Comoe Consonant Mutation.
(Proxy: Ilse Lehiste)
Thomas J. HINNEBUSCH (University of California, Los Angeles)
A Reconstructed Chronology of Loss: Swahili Class 9/10.
David DWYER (Michigan State University)
Sierre Leone, Liberia and Guinea as a Linguistic Area: A Preliminary Report.
Larry M. HYMAN (University of California, Berkeley and University of Southern California), Jan VOORHOEVE (University of Leiden), Jean-Marie HOMBERT (University of California, Berkeley), Gabriel NISSIM (University of Yaoundé), Kenneth STALLCUP (Stanford University), Maurice TADADJEU (Georgetown University), and Jacqueline WARNIER (University of Paris).
The Grasslands Bantu Working Group.

Session V: Syntax 2 (Afternoon, April 13, 1975)
Chair: Robert J. Jeffers (Ohio State University)

Bernd HEINE (Universität zu Köln)
The Study of Word Order in African Languages.
Ellen Contini MORAVA (Columbia University)
Swahili Existentials: A Semantic Analysis.
Annie HAWKINSON (University of California, Berkeley)
Possessed Nominals in Swahili: Inherent Ambiguity?
Elizabeth RIDDLE (University of Illinois)
Relational Grammar and Some Aspects of Swahili Syntax.
Frank R. BRANDON (Centro Unificado Profissional, Rio De Janerio)
A Disyllabic Word Constraint in Swahili.
Janet S. WAGER (University of Washington)
Extraposition and Subject Complements in Swahili.

Session VI: Tonology (Afternoon, April 13, 1975)
Chair: Arnold M. Zwicky (Ohio State University)

Carl R. LAVELLE (University of California, Los Angeles)
Universal Rules of Pitch Realization.
Donald G. CHURMA (Michigan State University)
Is Hausa a Suprasegmental Language?
Raymond O. SILVERSTEIN (Southern Illinois University)
Downdrift and Utterance Planning in Hausa.
A. N. TUCKER (School of Oriental and African Studies, London)
and Chet A. CREIDER (University of Western Ontario)
Downdrift and Downstep in Luo.
Jean-Marie HOMBERT (University of California, Berkeley)
Consonant Types, Vowel Height and Tone in Yoruba.
John GOLDSMITH (Massachusetts Institute of Technology)
Tone Melodies and the Autosegment.
Jan P. STERK (University of Wisconsin)
The Ordering of Derivational Tone Rules in Yoruba.
John M. CLIFTON (Indiana University)
Nonsegmental Tone in Lango.

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